AN ARGUS SPECIALIST PUBLICATION

October/
November 1984

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Origination and design by MM Design & Print, Circus House, 26 Little Portland Street, London W1N 5AF.

Published by Argus Specialist Publications Ltd, 1 Golden Square, London W1R 3AB.

CONTENTS

ASP FIGHTS SOFTWARE PIRACY

Much has been said and written in condemnation of software piracy but few have taken a positive stand against it. ASP is among those few that have taken action to help curb the grave problem of home copying of commercial software.

ASP has already taken steps to eliminate advertisements in our magazines which relate to tape duplication for piracy purposes. While it is appreciated that individuals may take 'back-up' copies of their own programs, it should be noted that it is *ILLEGAL* to copy commercially available software for other than personal use.

Software piracy is costing the software industry huge sums of money which is detrimental to the future development of the industry. It is in everybody's interests to dramatically reduce the level of software piracy primarily because firms need funds raised from software sales to plough back into research and development of new products. This means that the standard of software products can only improve.

ASP hopes our action will help combat this serious problem in order to maintain and improve the high standards of the UK software industry. We are asking *you* to do the same by refraining from duplicating or copying commercially available software for anything other than personal use.

PUTING

ZX Computing is published bi-monthly on the fourth Friday of the month. Distributed by: Argus Press Sales & Distribution Ltd, 12-18 Paul Street, London EC2A 4JS. 01-247 8233. Printed in the UK by: Garnett Print, Rotherham and London.



Subscription rates: UK £12.70 including postage. Airmail and other rates upon application to ZX Computing, Subscriptions, Infonet Ltd, Times House, 179 The Marlowes, Hemel Hempstead, Herts HP1 1BB (Tel: 0442 48432)

ZX Computing is constantly on the look-out for well-written articles and programs. If you think that your efforts meet our standards, please feel free to submit your work to us for consideration for publication.

All submitted material should be typed if possible; handwritten work will be considered, but please use your neatest handwriting. Any programs submitted should be listed, a cassette of your program alone will not be considered. All programs must come complete with a full explanation of the operation and, where relevant, the structure; Spectrum programs should be accompanied with a cassette of the program as well as the listing.

All submissions will be acknowledged and the copyright in such works which will pass to Argus Specialist Publications Ltd will be paid for at competitive rates. All work for consideration should be sent to the Editor at our Golden Square address.

Welcome

```
10   BEEP alarm, clock
20   PRINT"Time to get up!"
30   GO SUB bathroom
40   LET action = dress
50   GO TO kitchen
60   INPUT breakfast
70   GO TO work
80   LET action = work
90   IF time<1200 THEN GO TO 80
95   GO SUB wine-bar
100  INPUT food + drink
110  IF cash>0 THEN LET drink = drink + 1 : LET
     cash = cash - 1 : GO TO 110
120  RETURN
130  IF drink>4 THEN GO SUB bathroom: LET
     drink = drink - 1 : IF drink  6 THEN CRASH
135  IF drink < 3 THEN LET action = work
140  IF time<1700 THEN GO TO 130
150  PRINT"Hello dear"
160  INPUT supper
170  LET action = TV
180  IF time<2300 THEN GO TO 170
190  GO SUB bathroom
200  GO TO bed
210  PRINT"I've a headache"
220  LET action = sleep
```

Isn't it amazing how computing seems to take over your whole life!

I decided to go to the local to get away from computing for a while, if I wasn't working on my machine then one or other of the family usually was (including the cat who claims new peripheral cartons for his own). I needed a break.

On entering the "Merry Micro" I noticed a new device in the corner, a video juke box. Fascinating. Also expensive and chip controlled, much discussion ending back on micros. Try again.

A quick play on the fruit machine accompanied by the sound of zips and zaps from the latest arcade wonder sitting in the other corner. More chip control, more money, more talk, back to subject of micros.

Reset.

Join a group of friends from the local school, they are discussing control devices, word pros and educational software. Leave group. Move to join a bunch of local sportspeople, it's been a long time since I talked about football, cricket, horse-racing and other non computer related activities.

It took less than a micro-second before the conversation got round to horse and football forecasting programs and computer cricket simulations.

Give up, go for a long walk, go home. Its hard to believe that only 10% of the population are computer orientated, everywhere you look the subject is raised. Perhaps the space invaders were harmless, its the micro that seems to have taken over. Don't get me wrong, I still love the whole subject, but you can get too much of a good thing sometimes.

Back to school

Recently I was privileged to attend a teachers' course in Exeter which had been organised by the Council for Educational Technology, the Microelectronics Education Programme and Avon Special Education Microelectronics Resource Centre. Both the organisers and the members of the course were convinced of the value of using computers to assist with teaching. Each of us worked from 9.00am to 9.00pm attending demonstrations and lectures and then continued far into the early hours trying out what had been learnt.

The outstanding feature of the course was the system that had been devised to allow teachers to communicate their needs to programmers, a system of 'specifying' their requirements.

I am a product of the home computer boom and have no formal training at all. My particular likes happen to be machine efficient programs — much along the lines of the techniques used in the 1K Corral — and every time I saw or heard of "Structured" programming I tended to run a mile. However, trapped in the course, I had to follow this very subject. BUT now that I've experienced it first hand, seen how tremendously versatile it is and how easy it makes actual programming, I must admit to being completely impressed! Don't worry, I am not going to fill *ZX Computing* with educational programs or insist that all submissions are structured, but I do recommend that you take a look at this method, either by reading a book or preferably by attending a course of some kind (night school?), and decide for yourself.

Finally, I wish to thank all participants for the very friendly and warm atmosphere they generated.

Our education system is in good hands.

Contributions

We are always on the lookout for good programs and articles for future issues of *ZX Computing,* and where better to look than to our own readers. If, when reading through the magazine you think you can write programs as well, or better than, our present contriubtors, then let's hear from you.

All contributions are, of course, paid for at very competitive rates. So if you've got your eye on a new ZX add-on or you'd just like to supplement your pocket money, get writing! It is vital, though, that all the programs you send us are totally original, and not 'borrowed' or 'adapted' from other magazines or books. (When Tim Hartnell was sitting in the Editor's chair, he even received 'original' contributions he himself had written for his own books!)

Any kind of program (business, domestic, educational, or just fun) will be welcomed which use ZX BASIC in clever and efficient ways, or those which employ certain routines which can be re-used on other programs.

Program listings are vital, along with a clear explanation of how the program is constructed, what it does and what the user can expect to see once the program is RUN (a screen dump is particulary valuable in this respect). When submitting Spectrum programs, it is very important to remember to enclose a cassette of the program as well as the listing, as this will allow us to check the program before publication.

Fulfilling obligations

Dear *ZX Computing,*

It is with interest that I read a number of letters complaining about mistakes in listings published in *ZX Computing*. It is very gratifying to see that you intend to do your best to rectify this situation by using a different printer to LLIST. Of course, you will get complaints that the graphics in the listings are confusing as they appear as letters but by including a key at the start of the program showing the way that graphics will appear, I would have thought that this would have satisfied even the most particular of your readers. Having said this, and acknowledging that the Sinclair print outs are not that good, one is curious to know how, if *ZX Computing* get tapes and listings of programs, programs are still published which fail to run correctly. Whilst it's a real test of one's skill to locate and cure 'bugs' in a program which one has laboriously keyed in, it's pretty annoying to find out that whole lines have been left out. Surely someone tries these listings to make sure they work before they are published? Your readers should be able to key in the programs you publish, and, providing they haven't made any errors, run your programs successfully. That is a reasonable expectation.

There are a number of publications which seem to ignore that they have legal obligation to fulfil. I know that mistakes happen, and I note that you are prettv good at *ZX Computing* about publishing error corrections as are a number of other magazines. There are a number of paperbacks on the market that do not. The publishers of these books should be a little more careful The odd addage "caveat emptor" doesn't really hold much water in these days of Trades Description.

The question "What use is the IN function on the Issue III Spectrum?" needs answering by you and Sinclair. Nuclear Attack (Dec/Jan 84) Issue, is a typical example of how the IN command is now useless. On issue III machines the sights froze, missiles auto-fire, missile explosions didn't dissappear, bomber planes refused to fly across the screen. I tried the 191 substitution, as suggested only marginal improvement. I then read Dilwyn Jones' fine book "Delving Deeper into Your ZX Spectrum". I adapted a program from that book, somewhat laboriously perhaps, but with interesting results. The program scans the 8 sections of the Spectrum Keyboard and counts the number of times 191 is found at the I/O ports associated with these sections. The scans are carried out periodically, and after 100 scans, summarizes the results of 100 scans for each section. Stupid program you might think . . . without pressing keys, no change should be observed. Not so . . . print outs from this program showed that when the Spectrum heated up to normal operation temperatures, readouts based on 191 and 255 were observed, the incidence of erroneous readings being as great as 70-80% for some keyboard sections. When cold, the keyboard gave 191 readings consistently. It would seem that the ULA is unstable in it's effects. I wonder if Sinclair found this out after issuing the new model and have tried ever since to recover their position. In my eyes they have lost a certain credibility over this. I also believe that they may have tried to divert public attention from something which is their responsibility and which definitely has affected operation of the Spectrum. The IN function in it's original form provided an elegant solution to cursor control and provided a fine enabling mechanism. If the results of the program which I have sent you are correct, then it clearly confirms that the IN function is useless, certainly on my Spectrum and others which I have been able to test that were Issue III.

It would be interesting for your readers to discover if their Spectrums also exhibit this problem. It will also provide a good method of demonstrating whether or not they have an Issue III.

The Spectrum is an excellent little machine for the money, — unbeatable value. A lot of people have bought them. They deserve to know about how alterations are going to affect their machine's operation as soon as possible after that alteration has been made. Sinclair have been consistently evasive about this if the reports one reads are anything to go by. It would seem that Sinclair have had to be *cajoled* into revealing what they have to date only by persistent enquiries by the public and the user magazines (well some of them). By their own admision it is SEVERAL months since the ULA was changed. Still Sinclair have not really given the public a clear statement of how the ULA affects the operation of the Spectrum, and, more important, if there is a way to deal with the problem. IN is there for a reason . . . if it's no use then that is not what buyers of the Spectrum could reasonably expect from the handbook that Sinclair issue with their machines.

Best regards,
Dane Lavery

PS. For those of us who missed certain issues of your magazine, why don't you publish the program errors wich you have become aware of in a summary form for the last 6 issues updating by one month for every new issue. It wouldn't take up much room. It would save your readers a lot of effort flicking through their back issues and it would serve to highlight your own success in eliminating errors!

```
IN 65278=191     #IN 32766>191=7
IN 65022=191     #IN 49150>191=88
IN 64510=255     #IN 57342>191=5
IN 63486=191     #IN 61438>191=10
IN 61438=191     #IN 63486>191=6
IN 57342=191     #IN 64510>191=89
IN 49150=255     #IN 65022>191=3
IN 32766=191     #IN 65278>191=3

No of Checks=100
```

The first trial — see Fulfilling Obligations

```
IN 65278=191
IN 65022=191
IN 64510=191
IN 63486=191
IN 61438=191
IN 57342=191
IN 49150=191
IN 32766=191

No of Checks=100
```

The second trial — see Fulfilling Obligations

```
   0 REM "DETECT" Dane Lavery 1983
  10 LET x=0: LET y=0: LET z=0: LET p=0: LET q=0: LET r=0: LET s=0: LET t=0: LET d=0: LET g=0
  95 FOR n=0 TO 7
 110 LET A=65534-(256*2^n)
 115 LET B=IN A
 135 GO SUB 3000
 140 IF B>191 THEN GO TO 142
 141 IF B<=191 THEN GO TO 145
 142 GO SUB 1000
 145 IF n=7 THEN GO TO 4000
 146 IF A=32766 THEN GO SUB 2000
 150 PAUSE 5: NEXT n: GO TO 95
1000 IF A=65278 THEN GO TO 1100
1001 IF A=65022 THEN GO TO 1090
1002 IF A=64510 THEN GO TO 1080
1003 IF A=63486 THEN GO TO 1070
1010 IF A=61438 THEN GO TO 1060
1011 IF A=57342 THEN GO TO 1050
1012 IF A=49150 THEN GO TO 1040
1020 IF A=32766 THEN GO TO 1030
1030 LET x=x+1: PRINT AT 2,14;"£IN 32766>191=";x: RETURN
1040 LET y=y+1: PRINT AT 4,14;"£IN 49150>191=";y: RETURN
1050 LET z=z+1: PRINT AT 6,14;"£IN 57342>191=";z: RETURN
1060 LET p=p+1: PRINT AT 8,14;"£IN 61438>191=";p: RETURN
1070 LET q=q+1: PRINT AT 10,14;"£IN 63486>191=";q: RETURN
1080 LET r=r+1: PRINT AT 12,14;"£IN 64510>191=";r: RETURN
1090 LET s=s+1: PRINT AT 14,14;"£IN 65022>191=";s: RETURN
1100 LET t=t+1: PRINT AT 16,14;"£IN 65278>191=";t: RETURN
2000 FOR m=0 TO 17
```

```
2010 PRINT AT m,0;"
"
2015  NEXT m
2030 RETURN
3000 LET g=g+2
3020 PRINT AT g,0;"IN ";A;"=";B
3030 IF g=16 THEN  LET g=0
3040 RETURN
4000 LET d=d+1
4005 IF d=101 THEN  COPY : GO TO
 6000
4006 PRINT AT 19,0;"No of Checks
=";d
4010 GO TO 146
6000 CLS : INK 1: PAPER 7: BRIGH
T 1: FLASH 1: PRINT AT 10,0;"Do
you wish to run check again?"
6010 INK 2: PRINT AT 12,12;"(y o
r n?)"
6020 INPUT a$: INK 0: PAPER 7: B
RIGHT 0: FLASH 0: CLS
6030 IF a$="y" THEN  GO TO 10
6040 IF a$="n" THEN  CLEAR : PRI
NT AT 12,11;"Bye!": PAUSE 50: CL
EAR : NEW
```



Keyboard familiarity

Dear *ZX Computing,*
The biggest problem for many young children when first attempting to write or enter listings is lack of knowledge of the position of characters on the keyboard. To assist in "learning by play" I wrote the simple drawing shown below.

```
10 LET L=0
20 LET C=0
30 INPUT A$
40 LET L=L+( 21) * (IN-
   KEYS="6") —
   (L 0) * (INKEYS="7")
50 LET C=C+(C 31) * (IN-
   KEYS="8") —
   (C 0) * (INKEYS="5")
60 If INKEY$ = "9" THEN
   PRINT " * "
70 IF INKEY$ = "0" THEN
   GOTO 30
80 GOTO 40
```

On RUNing the program stops first at line 30. At this point any key(s) may be pressed. The character(s) will then be used for drawing using normal cursor (5689) control (who needs LOGO?!). Pressing key 9 will cause the present position to flash and pressing key 0 will return control to line 30 to enable the plotting character to be changed. Simple, but good fun, and it enables the beginner to cover the display in any of the characters.
A J Harper
7 Bell Close
Hitchin
Herts

Across the pond

Dear *ZX Computing,*
First, let me say that since finding my first copy of *ZX Computing* on the bookshelf of one of our booksellers here in the 'colonies', I have become an avid reader. I usd to read the U.S. publications SYNC and SQ Quarterly, but both have gone by the wayside what with TIMEX (Sinclair getting out of the marketing of the Sincalir line over here. So now it's back to the 'mother country' to keep life in the old ZX. Is there any way to go about obtaining back issues of *ZX Computing*? I would like to obtain Numbers 1 through 9 of volume 1 to complete my set.

I have had my 16K ZX81 w/Suntronics keyboard and Sanyo tape recorder in almost constant operation since 1981, and have only experienced an occassional RAMPACK 'crash' when my wrapping tape anti-wobble loses it's stickum. The ZX plays games, handles the family budget and financial accounts, and even occassionally runs communications system simulations when the big main-frame at work can't get to it.

Second, and my main reason for writing, I just got around to LOADing "MATHS MAZE" by Nick Broom (*ZX Computing* Dec/Jan 84), and ran into a couple of bugs. The first bug was a 5/3050 halt (Display full — Enter CONT to proceed). I solved that one with:

```
3045 CLS
```

The second bug was a 3000 to 3060 loop caused by not negotiating the maze while going around after the math signs. I decided the GOSUB 3000 wasn't bad, just the looping, so I modified the program as follows:

```
3046IF PEEK — 1490
     THEN GOTO 2000

     Graphics
2000REM * * * LEFT
     THE TRAIL * * *
2010PRINT ,,,,"YOU LEFT
     THE TRAIL. YOU
     HAVE"," BEEN
     PENALIZED ONE
     POINT."
2020LET
     SCORE=SCORE-1
2030FOR X=1 TO 10
2040NEXT X
2050GOSUB 6800
2060GOSUB 1000
2070RETURN
```

Now it runs like a champ, and forces one to be a little more careful in the maze if one wants higher scores.

I am now awaiting delivery of a TIMEX Sincair 2068 computer (the U.S. Spectrum), a TIMEX 2040 printer (the U.S. ZX printer) and a TIMEX 2020 recorder, which I ordered from TIMEX when they announced their closeout sale. I have introduced two of my co-workers to your magazine (they both have 2068s) and one has been LOADing 'DEPTH CHARGE' from the Feb/Mar 84 issue (no indication as to problems or bugs as yet).

Thanks for a great magazine. Keep on sending it 'across the pond'!
Sincerely yours
Bob Leuyck
USA

A little SAGA

Dear Sir,
As a possible candidate for a Royal Yachting Association Certificate I was very interested in the navigational programme by Mr. Eric Hutchinson listed in the Apr/May edition of *ZX Computing*. However, I have a problem!! I own a 16K ZX81 and have fed the program into it four times (20 hours' work!!) and I am unable to Run the program. All I get on the screen is an inverted L between " " 's. I am a recent newcomer to computing and perhaps I am making an error. However, where an O is used I am inserting 0 at lines 101,104,155,195,210,693, 694,767,920,925,935, 1009, 1019.

I assumed that the program would have to be RUN before any entries are made into it as with other similar programmes. Any advice will be much appreciated.
Yours truly,
A. Russell Hey

This letter was followed by....

Dear Sir,
With reference to my letter dated 11th April regarding my difficulty in loading the navigational programme by Mr. Eric Hutchinson in the current edition of *ZX Computing*.

I have been successful with this problem by 'loading' the printed programme from a tape into the ZX81 and there by getting the 00 on the screen. Instead of pressing 'Run' and 'Newline' which resulted in failure) I pressed GOTO 4015 and then 'Newline' and the instructions were displayed on the screen. This must show you that I am a newcomer to computing but thought it may help any other newcomers, should there be any nowadays!!
Yours truly,
A. Russell Hey

Taken to task

And now for a big 'un

Dear *ZX Computing,*
I was very disappointed in the example program taken from Mclean and Gordon's book of Spectrum programs ("Taken to Book" April/May). Apart form the high quality of the listing print, (my compliments to the editor!), the diary program is riddled with errors and inefficiencies. Although a full review of the book was made by Patrick Cain, I would like to comment on this particular program by posing the following questions:
1. **Why** is the 'Diary' displayed at the beginning for 2 seconds, and then wiped from the screen before the information is given? Could it not be displayed at the top of the screen with the information below it? I think the author of this program must be a CLS fanatic!

2. If option 4 is entered (line 130) by mistake, the screen is cleared, "Wrong response Press any key" is displayed, and you are very lucky if you see it! This is because — guess what? — the screen is immediately cleared and the program halts. Do you think:

PAUSE 0 : CLS: GO TO 110

or something similar is missing from line 140?

3. After reviewing or writing a page, the program returns to the place from whence it came and stops. Why? If it returned to the original menu of choices, more than one page could be reviewed or written. In this case, there would be the small problem when writing another page using a non-initialised array, d$. This will not all be overwritten if any test lines are short. So line 200 could be a subroutine for filling the array with spaces before jumping back to line 110.

4. Why should anyone want to run the program to choose option 3 and stop? Amending it not to stop after the completion of each process gives the selection of this option more meaning.

5. Why, after the selection of option 1, does the program clear a screen which is already blank? Sorry — my mistake — it doesn't since the subroutine starts at line 430. This leads me to ask.....

6. What is line 420 doing there?

7. Is PRINT d$ invalid? (line 490?) The only way I can display the array d$, which is 2-dimensional, is by using d$(n) and separating it for values of n from 1 to 21.

8. Why, after clearing the screen (line 150) and testing the options, is it necessary for option 2 to pause again and clear the screen-again? It seems to me that line 220 is unnecessary since the program pauses at line 230 to await the date.

9. What will happen if a date is longer than 10 characters when entered (eg. 17 September 1984)? I'm sure **we** know — an error when saving. The array will still exist when the program has stopped, but how many other users will know what was wrong, and how to save it correctly? This circumstance should have been allowed for, by way of a warning at INPUT time, perhaps, together with a test to ensure that the date is not too long.

10. Is line 140 (yet another CLS) necessary, since the screen is still clear and the input line has disappeared?

11. When the diary page is typed in, there is not a neat routine for entering each line, allowing for the ENTER key (code 13), after the key pressed to start the process has been checked for it's release. The facility for deleting a character is also provided (code 12), but that character is not deleted from the array, only overwritten when another one is typed in that position. Even the screen deletion does not work when it needs to be made on the previous line, so is this program really a simple word processor? Deletions on previous lines can be made to work if both i and j are altered and tested for less than 1.

12. Why on earth has the screen not been cleared when the tape recorder has been set-up correctly, so that the saving and verification messages do not appear in with the diary page?

13. Is mention made in the book's accompanying explanation of what to do if there is a verification error? All that is needed is for the user to SAVE and VERIFY again. But the naive user will try and RUN the program again, no doubt, and will then have to re-type the whole page.

14. Does this program have any of the basic requirements needed in a wordprocessor? In the editor's own words, "A wordprocessor.....displays text on the screen. This can then be altered, modified, adjusted, corrected, added to, or removed." The only facility which this program can perform correctly is backspacing on the screen, clearing each character as it does so. However, the next text must then be typed over the cleared screen positions to alter the text in the array, and then this procedure only works on one line of text. Not really a wordprocessor, I think.

15. My overall impression is that this program was written very quickly and not very well tested. Is this the standard of programming which home computers users must expect? This sort of inefficiency is giving programming a bad name, and is occurring all too frequently, not only in books, but in purchased software too!

16. What can you do if a program like this, from a book or magazine, does not function as it should? Try contacting **me** (a professional programmer) at BUGBEAR, my microcomputer advice service — all micros considered, no problem too small. Ring Kenilworth (0926) 55376 after 4pm weekdays for an initial chat.

Yours faithfully,
Frances Daniel.

Corrections for August/September

The August/September issue of *ZX Computing* contained two fairly minor faults. Some may say that they were very serious! But it's all relative y'know. Anyway, the first fault was with the program 'Day of the Week' from 1K Corral. The accompanying text to this program referred to a 'figure 2.' This figure was, as readers have pointed out, omitted. To recap., readers were invited to type in the variables shown in the elusive figure. So, to put the record straight, figure 2 is displayed in all its glory, somewhere about this page.

The second problem occurred with part 2 of David Nowotnik's 'Slogo' series. If you cast your mind back, the article contained several examples of Slogo in use. Now, whereas in the text David refers to 'square brackets', the illustration showed common-or-garden *curved* brackets. This was not David's fault, but came about through mis-interpretation by our typesetters. However, to put the record straight again, every reference to a bracket in LOGO should be to square brackets and not curved brackets. To avoid further confusion, we emphasise that square brackets **must** be used in LOGO programs, but not necessarily in the BASIC program used to implement LOGO on your Spectrum. Is that clear? No? If it isn't clear, refer to this issue's instalment of Slogo which shows the correct brackets used in the correct context. *Phew!*

FIGURE 2

```
LET JAN=0          DIM D$(7,6)
LET FEB=3          LET D$(1)="...SUN"
LET MAR=3          LET D$(2)="...MON"
LET APR=6          LET D$(3)="..TUES"

LET MAY=1          LET D$(4)="WEDNES"
LET JUN=4          LET D$(5)=".THURS"
LET JUL=6          LET D$(6)"...FRI"
LET AUG=2          LET D$(7)=".SATUR"
LET SEP=5          (Note spaces are shown by a dot)
LET OCT=0          LET E$ ="DAY"
LET NOV=3
LET DEC=5
```

The missing figure 2 from Day of the week — see corrections

Long sort

Dear *ZX Computing,*
I bought my first computer, a 48K Spectrum in April, mainly for storing data connected with my (other) hobby. I was therefore very pleased to find Nigel Salt's program 'DATAFILE' in Apr/May *ZX Computing.*

Having gained some knowledge of the keyboard, I eagerly typed in the program, followed by the first part of my data store (600 records, each of 15 characters over two fields). I then came to sort the file. HORROR! It took over 2 hours! Long than it took to type in the file in the first place.

Can onyone help? Can you publish a revised sub-routine, possibly in something I'm told is called 'machine code', which a novice like me can substitute for the SORT routine in Nigel Salt's otherwise excellent program.
Yours hopefuly,
N.A. Shackleford

Can anyone offer any help?

Notting Dale Hi-Res

Dear *ZX Computing,*
Since May of this year I have been in proud posession of a Notting Dale Technology G007 Hi-Res pack for the ZX81 (16K). I have written a Duckshoot program for the pack using some of Tim Hartnell's graphics from your June/July 1983 issue. I would like to submit it to you for publication in case there are any other G007 owners out there in Microland.

If you could publish this letter with my address then any G007 users might like to get in touch with me for a postal interchange of ideas, techniques, programs etc.
Yours faithfully
J D Almond
12 Wear Drive,
Springfield,
Chelmsford,
ESSEX CM1 5PT.

Sorry, but we cannot use the program. However we published your name and address as requested.

news



Anyone for tennis?

I'm sure we are all pleased to see Psion's new Spectrum program Match Point released on the Sinclair label. Hands up all those who were beginning to feel abandoned in favour of the QL?

I once owned and enjoyed a similar game on the Atari VCS game centre, but this version is far more sophisticated.

As in any computerised version of a real activity, be it physical or mechanical, it is unfair to compare it to the "real thing" however I would venture to say that Psion have got as close as is possible. By making the position of the player determine the type of shot played, a fair amount of subtlety and control has been achieved using only five keys or a joystick.

At £7.95 Psion have once again proved that it's worth waiting for their products.

Sinclair Research continues to expand

The ZX Spectrum continues to be the most popular home micro in Britain, according to market research organisation Audits of Great Britain. A recent A.G.B. survey shows that Sinclair Research continue to lead the field, with Commodore and Acorn in second and third places respectively.

Sensibly, Sinclair are not resting on their laurels but are spreading their wings in many directions. Sinclair Research has created a separate European marketing unit and, by the time this has gone to press, should have offices in Paris and Frankfurt, which will be responsible for a major sales drive. An estimated half a million European sales are expectd this year, and this should double in 1985 when full scale production of the QL gets underway.

Sinclair have recognised the need for programs which are written in the native language of the country and they believe this to be crucial for their continuing success. This should please our European readers, as we've had several very professional-looking submissions from them.

Presently, exports to the continent are critically low. When I visited some European cities a short while ago the lack of both computer hardware and software was striking, when compared to the proliferation to be seen in our stores.

At home...

Meanwhile, another distributor joins the existing team which includes Prism and Websters. London based distribution firm Lightning have a non-exclusive agreement to handle UK wholesale distribution of Sinclair Research's own brand software.

Lightning currently supplies independant computer dealers, book shops, and record, video, radio and electrical outlets, offering a 24 hour delivery service.

Events

I'm pleased to say that some organisers of computer events are now giving us enough notice to enable us to pass the information on to you.

MYCOMP — Ist Nov. onwards
Fulcrum Centre, Slough

This new show has been specifically designed to attract all those who want to buy a computer but are unsure of which one suits their needs.

Over 10,000 prospective home, business and educational users are expected to attend and lectures and discussions will be held daily and a special "hands on experience" area is to be set up.

PRESTATYN HIGH SCHOOL
2nd COMPUTER FAIR
Sat. 29 Sept. Prestatyn
10.00am -5.00pm

Local shops, suppliers and clubs will be along with samples and demonstrations, and local technology based industries, the armed Forces, IT and MEP will be there.

HOTECH - 3/4 Oct.
Royal Garden Hotel, London

Exhibition and conference devoted to computers in the hotel industry.

PERSONAL COMPUTER WORLD SHOW
19/24 Sept.
Olympia 2, London.

Wednesday 19th is Tradesmen and Press day, the show is open to the general public from the 20th.

One of the giants of the computer shows, last year over 46,000 people attended and this forced the venue to be relocated to this site.

Video and chips

A new six part series starts on ITV on Thurs. 9th Aug. Made by HTV the series has a wide ranging set of topics and is aimed at youngsters of 8+.

Director Alex Kirby intends to be "a fast moving, up to the minute show with the accent on fun".

In .... Brief

- Martech seem to be calling themselves Software Communications Ltd. these days and have produced "The Odyssey of Hope" for the 48K Spectrum. This is an adventure game featuring what they claim are instant hi-res graphics at each location.

Jump Challenge should also be around now, and this is described as a highly realistic game where you jump your motorcycle over obstacles. None other than Eddie Kidd himself will be helping to promote this game.

- Griffin Software have four recent additions to their educational programs of the 48K Spectrum, all are for maths.

Mental Arithmetic for age 8 +, Fundamental Algebra 10 to 15, The Theorem of Pythagoras 10 to 14 and Introduction to Trigonometry 12 to 16.

- Cheetahsoft, whose first two programs seem to be selling well, have signed an exclusie deal with Imagic of the USA to market their range of Spectrum software in the UK. The first two titles are Moon Sweeper and Dragon Fire and cost £7.95 each.

- Football Manager from Addictive games have been improved by the addition of some hi-res graphics. The company tell me that sales of this grandaddy of games are still as high as they deserve to be.

Versions are available for the ZX81 (no graphics), BBC and the 48K Spectrum at £5.95, £7.95 and £6.95 respectively.

- Mastertronic, the company who proved that selling games for £1.99 was not only viable but profitable, have formed a joint company with Galactic Software to secure their supply and to expand beyond games.

We look forward with interest to the next batch of programs.

- One of the most valuable prizes yet to be offered for the solution of a computer game (or puzzle as Haresoft insist it is called) is the famous Kit Williams' Masquerade Jewelled Hare. Players (Puzzlers?) will have to solve the clues in two programs, Hareraiser-Prelude and Hareraiser-Final, in order to win the hare, or cash prize of £30,000. Each game costs £8.95.

Haresoft is at PO Box 265, London NW1 7JD.

A bright spark

Thorn EMI has decided on their marketing strategy and created a series of programs for the VIC20, Commodore 64, Atari and Spectrum computers under the label "Creative Sparks". This has taken the publishing of computer software away from their video section and made it a part of their European publishing operation. The first two programs to make their debut under this label for the Spectrum were "Tower of Evil" and "Orc Attack", both for the 48K machine.

The graphics for both games are of a high quality and, although rather simple in plot, are decidedly addictive to play. Orc Attack has you defending your castle against increasingly numerous supernatural beings. This is done by throwing rocks at them until they reach the top and then hacking away at their heads with a sword. Should you survive long enough then a cauldron of oil comes to the boil and you can pour that on them and watch them all being destroyed by the flames. This then causes another more difficult wave of beings to attack.

Tower of Evil has you moving around rooms in the tower trying to find the key, treasure and goblet before moving onto the next level. There are over forty rooms to visit and fire its between each room. I'm afraid I couldn't get past the first fire pit! A challenging game.

Following these they released "Money Manager", a home budgeting program. It allows you to keep a record of all your income and expenditure and to help you plan your finances. There are seven different methods for cash analysis and interest calculation, but no matter which one I used I still ended up in the red.

Finally at the time of going to press, "River Rescue" — one of their previous releases — makes its debut on the new label. This was reviewed by Clive Smith in the APR/MAY issue and his final words were "definitely worth a trip to your local stockist to get yourself a copy"

All the Creative Sparks programs sell for £6.95

CCS stragegy

Cases Computer Simulations have been producing strategy and simulation games since the early days of the ZX81. Three programs have been added to their range recently, two of which are part of a new series of "pocket money" games.

"United" is the latest in their full price range and is similar to Football Manager, an addictive game which has been on the market for some time from — would you believe it — Addictive Games. However, CCS say that the problems are quite different.

I have tried both games and I can see there are differences. However, with my lack of knowledge of the subtleties of football and the management thereof, they didn't seem to be too diverse. The aim of the player is to take his team from the fourth to the first division and eventually the league championship. As manager, the player of United picks his team, trains them, buys an sells players, and scouts to find out the tactics of the opposition teams.



There is a graphical representation of the match, but this is disappointing. The pitch is displayed with circles and lines representing the position and path of the ball — not very inspiring.

The main strategy of the game seems sound and this part of the program can give pleasure for many an absorbing hour.

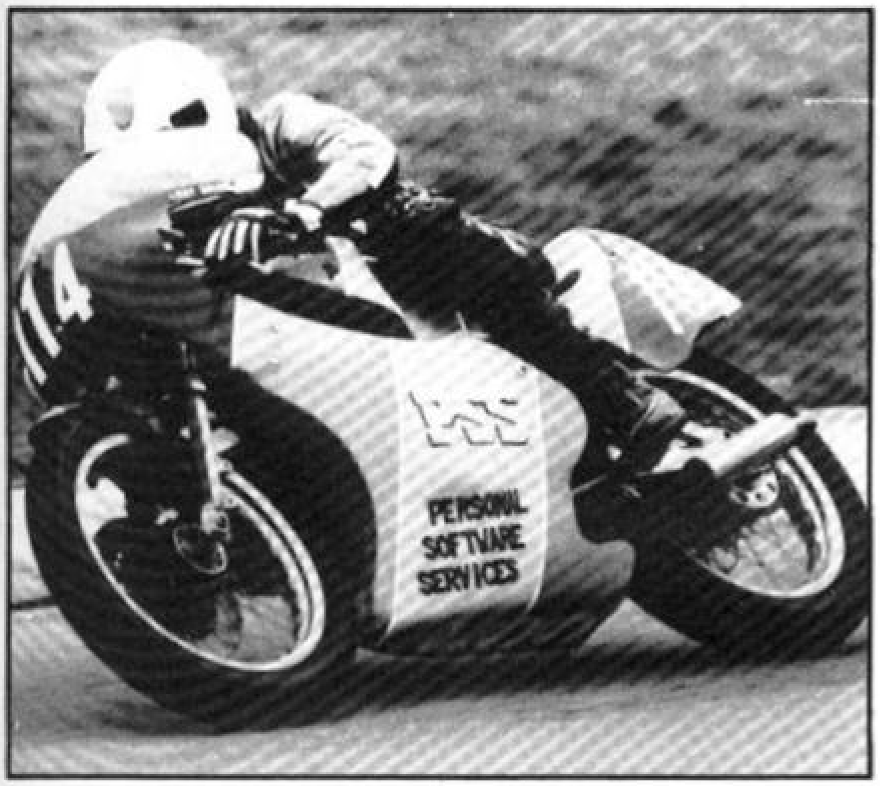
United costs £5.95.

A welcome development is the "Charlie Charlie Sugar" range of games. CCS are constantly trying to develop new ideas and though some, like their "Games for Girls" series, may not get critical acclaim, at least they're trying.

The first two, at £2.99 each, are "Whodunnit" and "Dix Mille". Whodunnit is an investigative game for up to four players which changes each time it is played. The object is to solve the brutal murder of Professor Carpenter. There are six suspects and from the facts given, and the answers to the question you ask, you try to deduce the culprit, weapons used, and the two valuable missing objects.

Similar to, but more complex than, a well known board game, Dix Mille kept my daughter occupied for hours. Dix Mille is a traditional French dice game similar to poke dice except that the scoring and combinations differ. Up to six people can play, with the option of the computer as one of the players. Scores are displayed and the game ends when all players have had the same number of turns and one or more has scored 10,000 points.





PSSt!

Coventry company PSS are very busy lately. Apart from having their premises broken into, they took part in Radio 4's business competition to attempt to win the Enterprise Award. They were one of twelve finalists competing for the first prize of £10,000.

Sport also comes in for support from them in the form of sponsorship to Kevin Bowes, a 23 year old Coventry motor cyclist. He has done well recently and has qualified for the Marlboro Clubman's Championship at Silverstone on the 23/24 September. Finally, the classic ZX81 favourite, The Gauntlet, has been repackaged and reissued. The news is that high street store Menzies reports an excellent response.

The Gauntlet costs £4.95 for the 16K ZX81.

The latest Spectrum game from PSS is Les Flics and is based on a little pink cartoon character and a policeman made famous by the late Peter Sellars. This is another good attempt at an arcade adventure game with a nice sense of humour.

Now showing at your local software centre for £6.95.

Argus Press Software Expands

APS seemed quite surprised at the success of their "Fall of Rome" strategy game and a fair bit of credit goes to Peter Holme, APS' marketing manager.

At the Earls Court Computer fair he arranged for a squad of live Roman soldiers to add to the chaos. In fact old met new when a wandering Robot decided to join in, all that was lacking was a visit from Dr. Who.

APS, appreciating the demand, have released three further strategy games.

INVASION is a simulation wargame where you have to exercise skill and judgement as



In . . . . Brief

• Voyager Software is a company which is new to me, and their first offering is Crazy Cranes for any Spectrum. The object is to unload ships as they pass by the pier. The problem? they don't stop and someone is shooting missiles at you!

Voyager is at Unit 31, Wirrel Business Centre, Gorsey Lane, Dock Rd., Birkenhead, Merseyside.

• Terminal Software have their first arcade 48K Spectrum on the market, called Carpet Capers and priced at £5.95. They describe it as being a tactical fun-action game about deranged carpet fitters and say that it has nine screens of machine code action. Sounds interesting.

• CRL have their long awaited and well publicised 48K Spectrum program "The War of the Worlds" on the market for £7.95. If you get stuck in this game then refer to the LP of the same name. I wonder if the game will promote the LP or vice versa!

• Some really top quality games have been produced since the last issue, one of which is "Worse Things Happen at Sea" — one of the most original games I've seen for a while! You become the captain of a very leaky cargo ship and you really have to work to succeed!

• Artic Computing Ltd. pledge to bring out at least one new game per fortnight until Christmas. Some of their recent releases in this batch are Mr. Wong's Loopy Laundry, a platform and ladders type game, Death Chess 5000, which will either play a normal game of chess or a hybrid chess/arcade game, and, my favourite, World Cup, a 3D perspective animated 1-9 player arcade type football game. Great.

All these programs cost £6.95.

• Brainbox Software, 20 Orange St. London WC2H 7ED have a brain twister of a program called Enigma on sale for £5.95. Its a real mind bender, the idea is to discover the rules — even the promise of five bottles of champagne failed to provided the stimulus for yours truly to succeed.

• Virgin continue to improve their output of 48K Spectrum games. Space Command is a 'shoot-em-up' game which provides plenty of action for space freaks.

The price is £5.95 from most stores.

• Great to see software from a new source. Ventamatic are sending their Spectrum range from Spain to the UK. The four games I have seen so far are Crazy Climber — a version of the arcade game where you climb up a building; The Builder — a simple but fun building block game; Martian Tunnels — a maze chase game, and Wreckage — a space zap game. The graphics are excellent and on the one I've seen, Crazy Climber — they really are going to make an impression on the market here. I only hope they get insert cards printed in English though, a lot of experimentation was needed before I could make any sense of the game!

• Computing is hell! Or at least playing Richard Shepherd's new game'The Inferno' is.This is a devious graphic adventure based on Dante's concept of hell as depicted in his book of the same name. At £6.50 it could easily be another classic for the adventure fraternity. Me? I'm still trying to get somewhere with the Hobbit!!

• Pop Quiz is a very impressive program of the quiz type. Stuart Henry, the well known DJ is promoting it and for every copy sold a donation will be made to the Multiple Schlerosis Society Research Fund.

Buy this program, have fun and help others, at £5.75 it can't be bad.

• From the USA comes good news for ZX81 owners. XOR is for the 16K ZX81 and makes use of hi-res (similar to Spectrum) graphics. A straightforward space invaders type game, it is probably the ultimate version.

Sold by J. Till at 96 Charles St. Stratford, Ontario, Canada N5A 5X7 it is a little highly priced at £9.95. I'll get Nick to check it out for the next issue.

In . . . . Brief

• At last, the long awaited Scott Adams Spectrum Adventure, The Hulk, is with us. Nicely presented and from what I've managed to play, very devious. Adventure fans go get it.

• Melbourne House's Mugsy is worth a good look. Essentially a strategy/simulation game, the graphics put it into the realms of a classic. Lucky 48K Spectrum owners!

• Longman Software presented what they describe as "Revolutionary software" for 0 level and CSE revision.

Maths, Physics, Chemistry and Computer Studies are the first five titles and each are presented via a database plus interactive programs.

Priced at £7.95 each, if they send us some for review I'll get Mike Edmunds to report on them.

• Fantasy have pensioned off Ziggy for the time being, and have introduced Beaky, one of the Andromedian Armed Condors — the rare goggled variety.

Yours task is to hatch out as many Beakys as possible by fighting off the Eggsnatchers. 12 screens are used in this fast arcade game — and it's not easy!

Look for it in your local software emporium. Priced at £6.50.

• A superb game from Micromega, Full Throttle does for computer motorcycle racing what Chequered Flag did for computer motor racing.

Many track options plus practice or race, excellent graphics and good, fast action. A must for all drive game fans.

• Widget have an excellent reputation for producing educational software, their two new programs are in the adventure game mould and are great for encouraging learning by experience.

Many people seem to think that education is about learning facts or practicing tables etc. In fact there is a great deal of learning done in an incidental way from programs such as these.

The two games on Adventure Playground are aimed at early readers up to 9 or 10 year olds and Castle of Dreams is designed for 11 to adults.

Not to be dismissed lightly and worth every penny of the selling price of £7.95.

• Star Trader is another excellent program combining the strategy of trading games with arcade elements. One of the most successful in a long line of attempts at this blend.

Available from local stores or from Bug Byte it cost £6.95.

• Compusound presents Block Buster (not to be confused with Blockbuster from Clever Cloggs, they're totally different). This is based on the TV series of the same name and is a challenging quiz game.

An extra set of questions is provided and further sets are planned.

• Software Farm had a resounding and well deserved success with Forty Niner, a hi-res ZX81 game. They have now produced the follow up, also in hi-res (Spectrum graphics without any add ons!!), called Rocketman. At £5.95 it is probably a must for the ZX81 owner, I'll get Nick to give his considered opinion in the next issue.

Software Farm is at 155 Whiteladies Rd., Clifton, Bristol, BS8 2RG.

• Microsphere now has Omnicalc 2 available. This is a much extended version of the widely acclaimed original, and possessors of the first version may upgrade by returning their original and paying only £8.00. The full price is £14.95 and this is probably one of the best spreadsheet programs available for the 48K Spectrum.

Microsphere Computer Services Ltd. 72 Rosebery Rd., London N10 2LA.

• Vortex Software has produced a superb flight game called TLL. The name is not very eye-catching and stands for Tornado Low Level. The graphics are superb and you really must get a look at it at your local store.



you move, supply and build up your limited defences of the Western Aliance, just prior to an invasion by the Red's tank armies.

BISMARK is for all would be sailors to try their hand at intercepting and destroying the Bismark. It's not easy!

PLANETFALL is my favourite, I was involved in attempting to get this program (22K original) into a 16K ZX81 from the listing published in *Computing Today* when I look over *ZX Computing*. That project had to be shelved as a consequence, but I did get an insight into the very complex logic behind it. Probably one of the most complex trading games I have seen, this program, set in the space age, will keep you occupied for hours.

All three programs are available at £6.99.

Also part of APS is the family firm Clever Cloggs. Their range of educational software is gaining in stature and receiving more positive reviews all the time.

Our reviewers are not part of the APS/ASP organisation and no pressure is put on them to go easy on the companies' products. A reflection of their value is that Star Trucker and Blockbuster (beware of confusion with another program Block Buster) were in the Non Arcade top 10 chart recently.

There are now eight games in the Clever Cloggs series; Party Time and Shipshades for age 3+; Jungle Jumble and Sam Safty for age 5+; Whizz Quiz, Blockbuster and Music for age 7+ and Star Trucker for age 9+.

Most of these have a series of questions as part of the program and when these become too familiar then they can be changed. A welcome addition to the range is a series of supplementary question tapes featuring Science, The Arts and General Knowledge questions which can easily replace those built into the program. Also, a Clever Cloggs club is run for fans of these games.

These programs cost £7.95 each.

Beginners' BASIC

Books on programming tend to be either very intellectual and hard to read or presented in a "computing by numbers for idiots and two year olds" format.

The majority of people probably fall into a middle of these two extremes and there is very little to appeal to them.

Clive Prigmore has written Beginners' BASIC to fill this gap. He is the Principle of Orpington College of Further Education and was previously teaching as the head of Computing. His skill and experience shows in this book.

Clive's previous book was written for the NEC (National Extension College) and the BBC to accompany The Computer Programme and indeed "30 Hour BASIC" has become the standard text for many educational establishments. Using the comments and feedback from 30 hour BASIC, Clive has refined his ideas and Beginners' BASIC is the result. It is published in the same type of binder but is approximately twice the size.

Although this book is written in 'multi-micro' style with the usual lack of specific routines, I would wholeheartedly recommend this to the average beginner because of the style and expertise. Anyway it is better to get to grips with the essentials rather than bogged down in details – I remember when I first used a BBC I spent three weeks just playing with the sound and envelope commands.

The book introduces principles and techniques of programming by means of worked examples and exercises (answer are given !), and later examples show how the problems of designing programs can be tackled. The advantage of "Structured" programming is discussed but is not over stressed.

The book attempts to show how programming can be an enjoyable, experimental, activity. The reader is encouraged to write his/her own programs rather than buy pre-recordeed ones, to find out about the language and become self-sufficient in BASIC.

By the end of the book the beginner should have developed sound programming skills, should posses a repertoire of useful programs and will be given firm indications of how to continue to develop an interest in programming.
The price is £9.95.

NEC + YTV = "Me & My Micro"



Am I getting senile or do I remember being told repeatedly that the correct grammer was "My micro & I". Are standards slipping or am I being fussy?

Anyway, this book from the National Extension College is £2.95 for 115 pages. The text is packed in and the programs are written in both Spectrum and BBC/Electron Basic.

Written by Paul Shreeve, the aim of the book is to show you how to write and develop properly structured and efficient, games programs. The professionals believe that you should never program to be machine efficient where this conflicts with structured programming, and yet this is often the only way to achieve satisfactory results when programming arcade games However, it is to Paul's credit that he has chosen programs which do not require this compromise to be made and so achieves his aim. He uses games to demonstrate the use of loops, printing, movement, string handling and keyboard control.

The book can be used in conjunction with the Yorkshire TV series of the same name or used on it's own. With the number of books on the market covering programming from virtually all angles, it really boils down to looking at what is available and finding one which suits your reading preferences. I suggest it may be worth your while having a look at this one.

In .... Brief

• Bernard Babani who market a variety of small, value for money books have added two more to their range, both by R.A. Penfold. "A Practical Introduction to Microprocessors" is intended for those who have some knowledge of general electronics but little or no understanding of microprocessors.

The book operates by constructing a simple circuit which the reader builds and experiments with. the cost is £1.95.

"Micro Interfacing Circuits – Bk 1" is for the amateur electornics enthusiast to build and use control devices for use with a micro.

Address decoding, analogue/digital converters and parallel/serial interfacing are all dealt with. The price is £2.25.

• Kingfisher Books have published "A Beginner's guide to the ZX Spectrum", written by R. & D. Graves, a father and son team, and priced at £2.50.

Described as a clear, well structured, straightforward guide based on overcoming problems experienced by them when learning, it should be worth looking at.



• Duckworth are publishing two books of interest to Adventure game fanatics, "The Adventurer's Companion" by M. & P. Gerrard is a complete guide to playing four of the most popular adventures: The Hobbit, Colossal Cave, Adventureland and Pirate Adventure.

"The Adventurer's Notebook" is a must for all adventurers. The main part is a series of ready made maps with space for nouns, verbs, locations etc.

A chapter for beginners is included as well as a hints and tips section, and a list of recommended adventures is included. Both books sell at £3.95.

• Linda Hurley has added "Spectrum programming for young programmers" to her previous title "ZX81/TS1000 programming etc.."

Both published by McGraw-Hill they are worth looking at if you prefer your information presented in a step by step and very simple way.

In .... Brief

• Robot control is interesting more and more people, especially those in the field of education. The main problem is the cost, but this too is coming down gradually.

Powertran Cybernetics, Andover, Hants. produce four different fully programmable robots, the simplest is Henbot II, a turtle type robot at £95.00, and the most expensive is Genesis P102 a complex robot arm at £1476.00.

• Kelwood Computer Cases, Downs Row, Moorgate, Rotherham S60 2HD have come up with an interesting idea, why replace the whole of the Spectrum's case when all that is really needed is that the keys themselves are replaced?

K-Board simply replaces the keys and switches with a complete top of their own, not just the rubber keys like some units. This means that only the height of the actual keyboard is altered and so all add ons, interfaces etc. are not affected. This is certainly an alternative worth considering and as Kelwood can often be seen at Microfairs etc. I'll let you know as soon as I can get a good look at one.

K-Board costs £28.50.

• Challenge Research, 218 High St., Potters Bar, Herts. EN6 5BJ have a cassette recorder specifically for the Spectrum. At £65.95 it seems expensive, but it connects via the user port and it is claimed that all software, including commercial, loads four times as fast and with increased reliability.

One has been despatched for review and I'll give more details as soon as I can.



Four from Dk'tronics

Dk'tronics has always been a company which, as far as I know (I add that because as soon as I say something with confidence someone always write in to tell me of their horrendous experiences to the contrary), has always produced good, reliable wares.

Four units have been produced recently by them and all look quite interesting. Unfortunately although they sent a couple of items to us the GPO managed to mislay them, therefore I won't be able to give a "hands on" report as I like to do but will simply reiterate the information supplied by them.

The keyboard

The first item is a Microdrive compatible keyboard. Now I have used one of theirs for the last year and I have been very pleased with it. There were a few minor problems of which I know two have been corrected.

The lack of a proper space bar has been remedied and the delete and decimal point keys are provided in single keypress form. A good ideas as I'm always entering data as 1 m2 etc.

The keyboard can be used with the Spectrum alone or with interface I attached and the Microdrive leads are fitted to a 16 way cable on the left of the case.

The numeric keypad which was a feature of the earlier model is retained and Dk'tronics tell me that the old problem of the key legends which were printed on stick on labels and which soon rubbed off has been eliminated by having the print on the underside of the label! — simple when you think of it!

Until I see a production model I can't say if they've done anything about the back of the case which sloped awkwardly on the old model, hopefully they harkened to the criticism and modified this design fault.

Regardless it looks to be a very good buy at £45.00, the same price as their old model, and I may invest some of my ill-gotten gains on one myself.

The joystick interface

Into the crowded world of joystick interfaces is their offering. This is fully programmable and they claim it will work with any software from any supplier.

This seems to be achieved by mimicing the keyboard and it does not disable the keys while in use. This is important as many programs need more than five keys to play them.

Often I have commented on the lack of planning when add on producers make their units dead ended — ie. you can't add anything onto the back of it — this one is supplied with a full through port so printer, speech interfaces etc. can be used with it.

The price is also very competitive £22.95.

The Beep Amp

A new interface boost the aptly named beep so much that a volume control was deemed necessary, a boon to many parents no doubt.

This is supplied with separate 4" speaker in a "pod" type box and 1 m of cable.

The cost of this is £14.95.

The 3 channel sound synthesizer

This incorporates the Beep Amp but adds the capabilities of the usual AY-3-8912 sound chip. I have used this chip in other units and it is capable of fantastic things.

However the end results depend on the programmer's skill or the software provided and as yet I have no information as to what, if any, support Dk'tronics will be providing in the way of programs.

The same speaker in it's pod as for the beep amp is supplied with this unit.

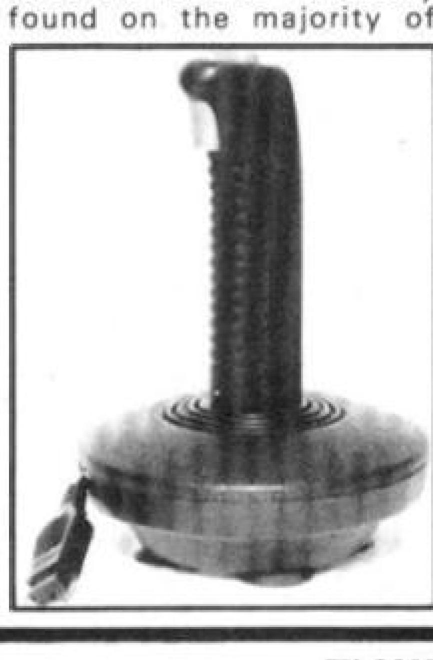
If sound and/or music is an interest of yours then this is a unit worth looking at.

It will cost you £29.95.

Super champ joystick

Dean Electronics Ltd. who import and market the impressive Alphacom 32 printer have entered the crowded joystick field.

Again this is an American import which they tell me has been the top selling joystick in the USA for the last two years due to several features not usually found on the majority of joysticks. Instead of having a trail of cable lurking around your computer, the Super Champ's ten feet of cable can be retracted into the base of the joystick when not being used.



The handle is said to be specially contoured to provide maximum comfort for both left and right handed players.

A feature which Dean Electronics describe as a 360 degree swivel base with suction cups for single handed control is mentioned, I'm sure this probably does something useful but I can't clarify as we have not yet received one for review.

Finally it is claimed to be robustly built to withstand the severest of "physical abuse" — that's one test I'd enjoy putting it to when those aliens beat me yet again!

Available at £12.95 from most high street stores or from Dean Electronics Ltd. Glendale Pk, Fernbank Rd, Ascot, Berks. (plus of course £1.00 p&p).

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- As part of the "Eureka!" pack, you receive a full-colour illustrated booklet, containing cryptic riddles and mysterious illustrations. Using booklet and screen *together*, you steadily unravel the clues and build up a secret phone number piece by piece.
- If you're first to ring it, you save the world and collect the £25,000!
- Quite a package! And to give everyone a fair chance, "Eureka!" will be released simultaneously worldwide on October 31st, 1984. No packs will be available until that date. All orders received by mail or phone by 26th OCTOBER will be despatched by post on the 31st right across the world. So order now, and be one of the first off the mark.

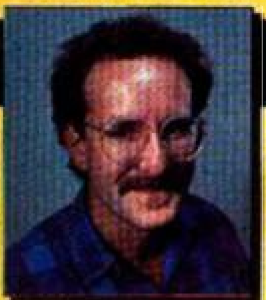
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The storylines for "Eureka!" are by Ian Livingstone, whose "Fighting Fantasy" books have sold over 2,000,000 copies. He's dreamed up some rather nasty tricks and twists for you in this Epic, because he has also devised the cryptic clues and conundrums in the booklet that goes with the program. He's the one who knows the answers.

"Eureka!" was programmed by Andromeda teams led by Hungarians Donát Kiss and András Császár. It took the equivalent of 5 YEARS to create, and the skills of 4 graphic artists, 2 musicians and a professor of logic too. We told them to stretch the hardware's capabilities, and make sure you were kept awake for hours!! They've done it...

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On Line

Ray Elder describes his close encounter with British Telecom

This is an account of how I became one of Prestel's customers, and a description of what the computer information service offers from the point of an interested incompetent.

I have always been fascinated by the more practical aspects of computing, you only have to remember my previous project on using a Spectrum for word processing to realise that, and the thought of being able to access the information on British Telecom's computer intrigued me.

Early in June 1 contacted Micronet 800, a computer specialist user group who provide an information service on the Prestel Database, and applied for registration with them.

Prestel is very similar to Ceefax and Teletext, services offered by the TV companies, in display and basic functions but with two very important differences.

The first is that you can communicate with Prestel by sending messages, replies to questions and quizzes and also download information and programs into your computer or to a printer for a permanent copy.

The second is that you have to pay for it! however at off peak times, after 6.00pm weekdays or 12.00 Saturday or all day Sunday the use of the computer is free, but you still have to pay the standard phone charges either at local or national rates depending on which computer you contact.

In order to use the Prestel computer you must be a member of one of it's user groups, once you become a member then you have access to all the other information in the database except for some pages which another user group has set up and may want to keep private.

Having phoned Micronet, (01-278 3143), a few days later a letter and an application form arrived. I dutifully completed said form and returned it to them the same day. I was starting to become quite excited about it.

The equipment

Before I continue the saga any further it is worth mentioning the various boxes which will allow you to connect your computer to BT's lines. Note that any equipment attached to the phone needs to be approved by BT, so look for their approval sticker before purchasing anything.

A specialist system of a keyboard/keypad and a connection device can be acquired, but for one purposes I'll take a brief look at the modems available to link up the Sinclair computers, both Spectrum and ZX81.

By the way, the modem is a MOdulator/DEModulator and is the device which connects the computer to the phone lines and by which the signals to and from the computer are matched to the signal that is sent over the phone lines.

This use of a universal standard means that you can communicate with someone who is using a completely different micro and not only another Sinclair user.

There are two methods of making the connection, probably the cheapest is by an acoustic coupler. This is a rubber device into which you insert the telephone handset and all signals are sent audibly. The computer is then loaded up with accompanying software and the connection is made as normal.

The disadvantage with this system is that in a noisy environment extraneous noise may cause the link to fail. An advantage is that if you own a portable computer then information can be sent from a call box anywhere in the world and collected later on your home (or office) based machine.

The other method is by using a direct connection via the detachable telephone socket that is fitted to the latest phones installed. If you have the old type of connection then BT will have to change it, this may cost £25.00, but many "special" offers are around and Micronet were (and may still be) providing this free when I joined.



Meanwhile...

A week after I posted my application a large envelope bounced off the doormat and was quickly sat on by the cat. After removing the moggie I tore it open (the envelope, not the cat) and found a nicely produced folder of information, a Prestel contributors directory, a welcome letter and an advertising brochure from a well known credit card organisation.

The people who provide and maintain the pages are known as Information Providers or IP's — yet another bit of jargon to remember.

The letter proclaimed "WELCOME TO MICRONET 800! YOU ARE NOW ONLINE TO ONE OF THE WORLD'S LARGEST DATABASES." Except I wasn't.

My phone had one of the older type of connectors and I couldn't link up to the phone lines until a BT chappie changed it. I also had another problem. My phone was situated in the small entrance hall at the front of the house, my computer was set up at the back.

There was no room to put the machine with the phone and it wasn't practical to have a 20ft lead running through the centre of the living room, not with a cat that attacks anything, a child who eats anything and other members of the family including myself, who'll trip over anything.

So the phone would have to be moved. No great problem as the line arrived at the back of the house anyway, all they'd need to do was drop it down, bring it in the window and add the new connector.

The other reason that I wasn't online was that all users have their own customer identity and password to prevent someone else from using the service at your expense, this would be forwarded in a separate envelope later.

With all this justified security I was expecting Securicor and full escort to arrive and not just



the plain brown envelope that eventually was sat on by the cat.

Excitement becoming more intense.

The Spectrum box

The unit which I am using is the Prism VTX5000, this is a direct connection device which fits under the Spectrum and is the same length but slightly deeper so that a bit will either stick out in front or at the back. It is compact and has an ON light, a LINE light connected to a toggle switch and a 3 way slide switch marked M/NET, Tx and Rx on the front.

A lead comes from the back of the unit and is plugged into the phone socket, the telephone lead is then plugged into the socket provided at the back of the modem.

A connector ribbon is supplied which has three sockets, one for the back of the unit, one to fit the Spectrum's port and one which provides an extension for the printer etc. This lead was rather short and I would have liked it to have been longer to allow for non standard set ups.

I do not have a Microdrive as yet, but I can foresee difficulties in using both together, some unsatisfactory lashing together of leads and the devices would have to be undertaken. I have my Spectrum housed in a DK'Tronics keyboard and there was no chance of the modem fitting beneath it!

I solved the problem by putting the modem on top of the keyboard and plugging one socket into a Currah micro slot adapter. The unit hangs over the back and I support it with wooden block legs, this is only satisfactory because the whole lot is permanently housed in a cabinet and the back is not seen.

The manual is a work of art, only a genius could make something so simple so confusing!

Actually each section of the manual is written in a very clear step by step manner, its just that the sections were put together in a confusing way. The main sections dealing with operating the modem are in two chapters, "The main features" and "User instructions in more detail".

Being a 'do it by numbers' type idiot, I found myself trying to operate the system from the first section which does not contain an adequate explanation. It would have been better if all the details of "How to log on" for instance, were not split into the two sections.



On Wednesday the BT engineer called, I was out, my wife explained what was required, move phone from front to back of house.

"Ummm. Very sorry, that's an 'outside' engineers job. Can't do it, I'll talk to the boss" and away he went. The next week two of them turned up and spent a day drinking tea and climbing ladders. Eventually the phone was repositioned, a very neat job, they even fitted two sockets and also managed to sell us a new phone!

Cost £18.00 (the reason I'm quoting prices is so the Taxman will make an allowance)

Fine — **except** that the phone now permanently picks up radio 4 and this does not seem to be appreciated by Prestel. Excitement reached fever pitch.

ZX81 box

I'm afraid that I haven't been able to test out the ZX81 adaptor as either my letter to them has been lost in the post, or the unit has been delayed on its trip to us. I will quote from the information I have.

The unit fits between the ZX81 and the RAM pack and other peripherals such as the printer, and it can be used in conjunction with both acoustic and directly connected modems. With both ZX81 and Spectrum units the screen is changed into a 40 character per line format and the double height and graphic modes are also used.

The ZX81 loses the colour, flash and more sophisticated screen controls but the Spectrum unit copes admirably.

I have been told that the ZX81 screen does not completely fit onto the TV and that a sideways scroll is provided to allow you to read all the text.

Considering the problems it sounds like an ingenious device!

The last roundup

Finally all was ready, connected and powered up. Here we go! As soon as the Spectrum was switched on the Micronet 800 logo appeared, on pressing a key a menu of seven options was presented, the last being to go to BASIC.

I am using the ZX Lprint III Centronics interface to drive a Shinwa printer, this has to be initialised before use so I pressed seven. The machine then reset, ie cleared out all programs and gave the usual Sinclair copywrite notice.

I initialised the interface and then stopped. There was no way of getting back to the Modem program bar turning off and on the power to the machine, and this would mean the interface would need to be reinitialised!

After many attempts I discovered that by getting into LOAD or SAVE mode from the modem and pressing BREAK, I could initialise the interface and get back to the modem. Fortunately they had allowed for load/save problems and also you may need to get back after downloading software.

Right, option 0, enter my identity, phone number given. When carrier tone (a high pitched whistle) is heard switch on modem, replace phone.

I did. It worked!

After entering my personal password I was greeted by name and allowed free access to the whole lot, and what a lot there is. I haven't counted but there are hundreds, probably thousands of different companies providing information. I was able to demonstrate its use to four people, none of them interested in computers, by finding a subject they were interested in, wines, photography, camping and money.

I was able to save screens on tape or printer for a permanent copy, download software, some free — perhaps not professional quality, but what can you expect — and some charged for.

I can order goods through this system by quoting my credit card number (now I understand why American Express sent their brochure) or reply to questionaires.

I can send and receive messages to other users on the Micronet mailbox, and by joining Directel, another user group, I can use their mailbox facilities.

I also found a "personal" section somewhere in the system which was very amusing, a set of messages to and from users almost like an electronic version of CB.

It would take months to just look at all the info. held in the system, but I'm convinced there must be something for everybody and personally I find it the most exciting development that I've encountered.

A word of warning, it is easy to become so engrossed in the system that you lose track of time, remember that all the time you are on line you are being charged for your call at the appropriate rate!

So far I must have spent enough time logged on to keep Buzby in birdseed for a year or two!

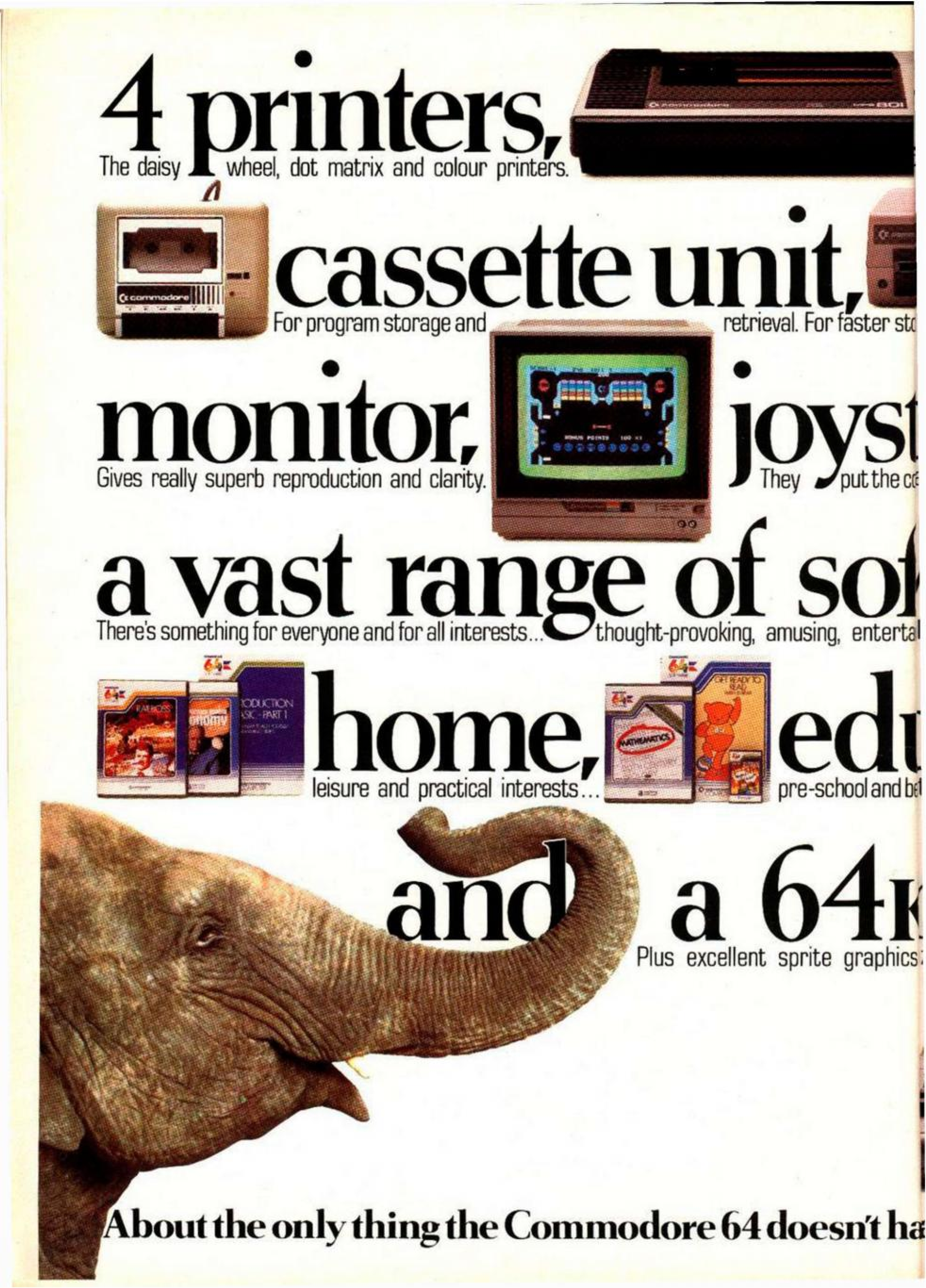
I adorn this article with some samples of the Prestel IP pages, and if any readers are using Micronet already or link up in the figure, then I can be contacted through Mailbox and my number is 919993265, whether I will be able to manage to find the time to reply to everyone who writes will depend on how many people make contact. As usual I'll do my best.

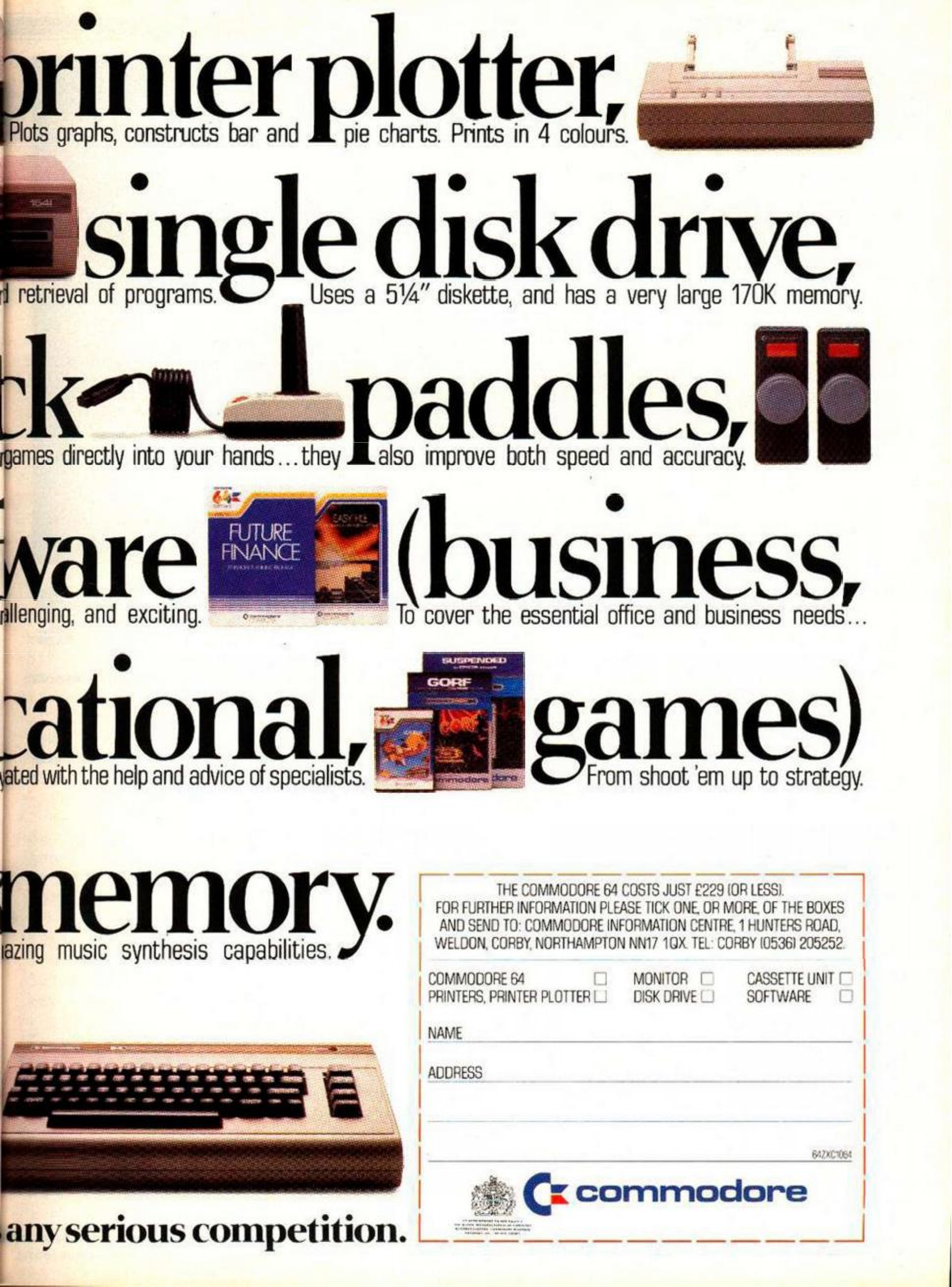
PRISM MICROPRODUCTS LTD.
(VTX5000)
Prism House,
18-29 Mora Street,
London EC1

MICRONET 800
Telemap Ltd.
Scriptor Court,
155 Farringdon Road,
London EC1R 3AD.

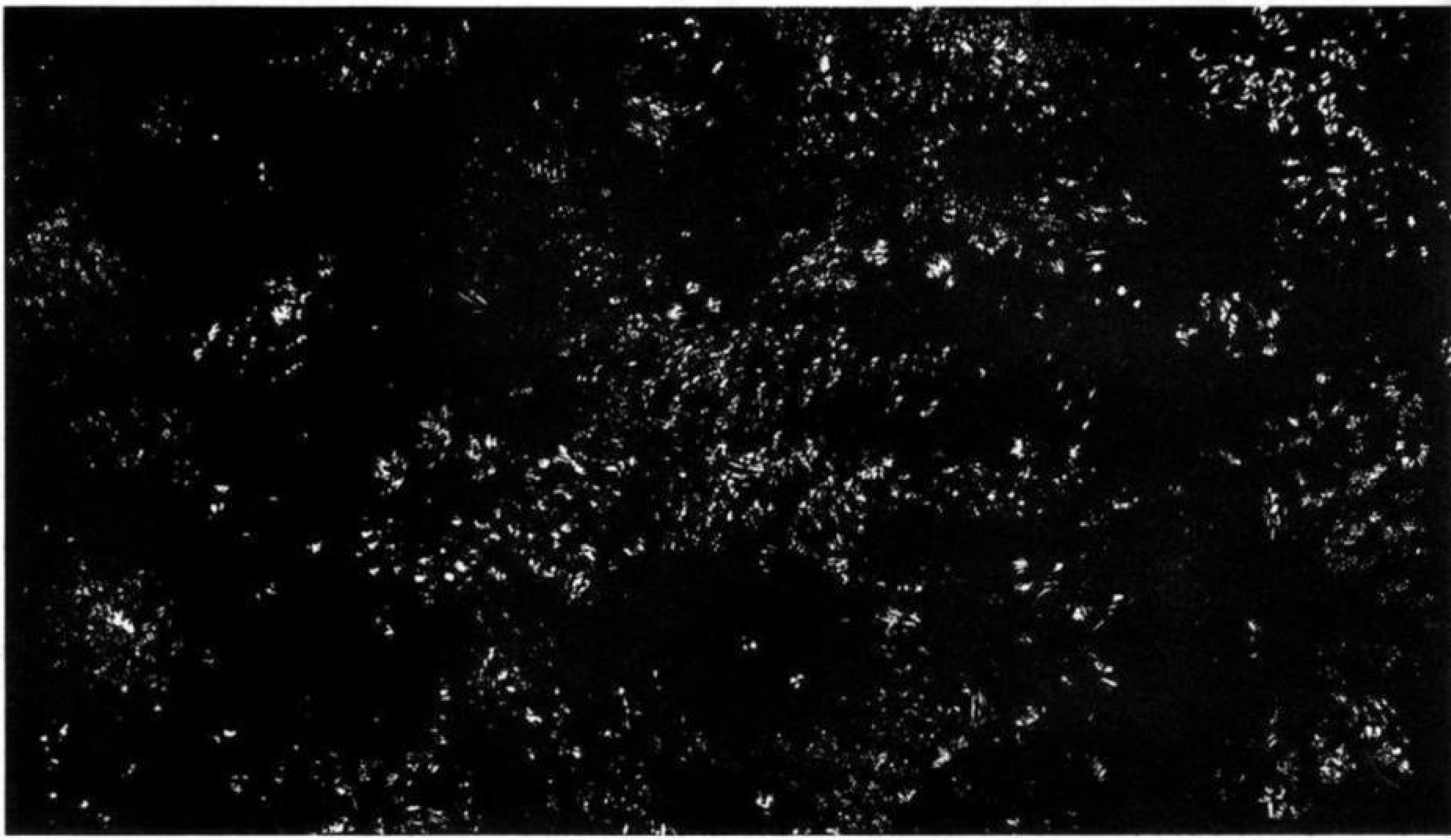
MICROCOMPUTER RESOURCES
(ZX81) adaptor)
1 Branch Road,
Park Street Village,
St. Albans,
Hertfordshire

MAPLIN ELECTRONIC SUPPLIES
(Modem kits, software
and interfaces)
PO Box 3
Rayleigh,
Essex SS6 8LR


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The daisy wheel, dot matrix and colour printers.
cassette unit,
For program storage and retrieval. For faster
monitor,
Gives really superb reproduction and clarity.
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There's something for everyone and for all interests... thought-provoking, amusing,
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Plus excellent sprite graphics
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Plots graphs, constructs bar and pie charts. Prints in 4 colours.
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THE COMMODORE 64 COSTS JUST £229 (OR LESS).
FOR FURTHER INFORMATION PLEASE TICK ONE, OR MORE, OF THE BOXES AND SEND TO: COMMODORE INFORMATION CENTRE, 1 HUNTERS ROAD, WELDON, CORBY, NORTHAMPTON NN17 1QX. TEL: CORBY (0536) 205252.
COMMODORE 64 ☐ MONITOR ☐ CASSETTE UNIT ☐
PRINTERS, PRINTER PLOTTER ☐ DISK DRIVE ☐ SOFTWARE ☐
NAME
ADDRESS
64ZXC1084
commodore



The Sky at Night

J D Nicholson presents a program based on the sky at night in Lincoln.

A neat little program to help you identify some of the constellations, the program will display each of the star patterns in turn asking you each time if you wish to try the test.

If you enter "Y" or "YES" you will be passed on to the test routine, otherwise the program continues to display the next pattern. Once all the sets have been shown, the user is encouraged to try the test.

You must be extremely careful with the strings in the lines from 500 onwards, as a mistake will cause a universal disaster!

I suggest that you check each pattern with the screen dump and make corrections as you go.

The last time I saw stars was when I'd refreshed myself overmuch at the Plough and Harrow . . . .

```
  20 FOR I=1 TO 3
  30 FOR J=0 TO 14
  40 GOSUB J*20+500
  50 PRINT TAB 10;C$
  60 GOSUB 1000
  70 PAUSE 100/I
  80 CLS
  90 NEXT J
 100 PRINT "WOULD YOU LIKE TO TR
Y THE TEST?-YES/NO"
 110 INPUT X$
 120 IF X$(1)="Y" THEN GOTO 150
 130 NEXT I
 140 PRINT "PLEASE TRY THE TEST"

 150 PRINT "WHAT DIFFICULTY-1,2,
3."
 160 INPUT A
 170 LET D=3-A
 180 LET S=0
 185 PRINT
 190 PRINT "ENTER EACH LETTER SE
PARATELY AND N/LINE AFTER EACH"
 191 PRINT
 192 PRINT "IF  THE  ANSWER  IS
TWO  WORDS REMEMBER  TO  ENTER
A  SPACE   BETWEEN THEM"
 195 PAUSE 500
 200 CLS
 210 FOR Q=0 TO 14
 220 GOSUB Q*20+500
 230 GOSUB 1000
 240 PRINT C$( TO D);
 245 FOR K=D+1 TO LEN C$
 250 INPUT B$
```

```
260 IF B$=C$(K) THEN GOTO 290
270 LET S=S+1
280 GOTO 250
290 PRINT B$;
295 NEXT K
298 CLS
300 NEXT Q
310 PRINT "SCORE=";100-S;"/100"

320 PRINT "D0 YOU WANT ANOTHER
TEST? Y/N"
330 INPUT X$
340 IF X$(1)="Y" THEN GOTO 150
350 PRINT "DO YOU WANT TO START
AGAIN? Y/N"
360 INPUT X$
370 IF X$(1)="Y" THEN GOTO 20
375 CLS
380 PRINT AT 10,10;"THANK YOU"
390 STOP
500 LET A$="22*.21- -.20*   *.2
0-.11-*-------*.09*-21-.08-22*.0
7-22-.06*--*-------------▒---*20R
EGULUS."
510 LET C$="LEO"
515 RETURN
520 LET A$="04*---*-.10-.11*.12
---*-------*.15-23-.16-22-.16-22
-.16*-----*."
530 LET C$="URSA MAJOR"
535 RETURN
540 LET A$=".12*.12-.12-.12-.12
-17+-------*02DENEB▒----*----.12
-.12-.12-.12*.12-.12-.11*."
550 LET C$="CYGNUS"
555 RETURN
560 LET A$="03*.04--.06--20+.08
--21*+.10--17----.12*----.12-.02
*----    - ++.07----▒ ++06ALDEBA
RAN---.18*.19--.21-- +.23-+."
570 LET C$="TAURUS"
575 RETURN
580 LET A$=".10+--▒VEGA.13-.13+
.13-.12- -.11-   -.10+16-.11-16+
.12-16-.13- -.14-.14*."
590 LET C$="LYRA"
595 RETURN
600 LET A$=".11*----▒CAPELLA.11
-   -.10-17-*.09-17*.09*17-.09-
17-.09-17-.09-17-.10-17-.11-17-.
11-15--*.11- --.12*."
610 LET C$="AURIGA"
615 RETURN
620 LET A$=".06*---*.05-    -.0
4+10-.05-11-.06-11-.07-12+.08-13
+.09-*14-.11--15-20*.13-- -  -.1
5---▒ARCTURUS.17-.16+."
630 LET C$="BOOTES"
635 RETURN
640 LET A$=".17*.18*.17-.16-.15
-.14▒PROCYON.13-.11-.09-.08+.08-
.07-.07+."
650 LET C$="CANIS MINOR"
655 RETURN
660 LET A$=".03*26*..04-25-..05
-24-..06-23-..07-13-*21-.12-  -.
08-  -   *   -.10-17--*.09*."
670 LET C$="CASSIOPEIA"
675 RETURN
680 LET A$=".08SIRIUS▒----*.14-
.13-.13-.13-.12-.12*.12-.12*.11-
-.10+   *.09-15▒------*.08-.07*
."
690 LET C$="CANIS MAJOR"
695 RETURN
700 LET A$=".13*-.12-  -.11-16*
.BETELGEUZE▒16-.10-15-.11-  -.12
- -.12** *.12- + -.11-  + -.11-
*  -.11-17-.11-18▒RIGEL.11*."
710 LET C$="ORION"
715 RETURN
720 LET A$=".07*.08-.09-.10-.11
-.12-.13-.14-.15*.15-.15-.15-.15
*."
730 LET C$="ARIES"
735 RETURN
740 LET A$=".01*.01-06+.02-  +.
03*-.04-.05*.06-16-*.08-*-----*-.
09-14- -.08-14- *.07-14-.07*----
-*.14+.15*.16-.16-.17- -*.17*-."

750 LET C$="PEGASUS"
755 RETURN
760 LET A$=".08*15*.08-15-.ALTA
IR▒--+.05- -  -   -.05+-11- -.12
*.10-- -.09+14-.08-15-.07*16-.17
-.18*."
770 LET C$="AQUILA"
775 RETURN
780 LET A$=".10-*-.09-13-.07+-1
4-.07-14-.08-15-+.09-+--*-.17-..
18-..19-..20+."
790 LET C$="DELPHINUS"
795 RETURN
1000 FOR L=1 TO LEN A$
1010 LET N=CODE A$(L)
1015 IF N=27 THEN GOTO 1090
1020 IF N>27 AND N<38 THEN GOTO
1060
1030 PRINT CHR$ N;
1040 NEXT L
1050 RETURN
1060 PRINT TAB VAL (A$(L TO L+1)
);
1070 LET L=L+1
1080 GOTO 1040
1090 PRINT
1100 GOTO 1040
```



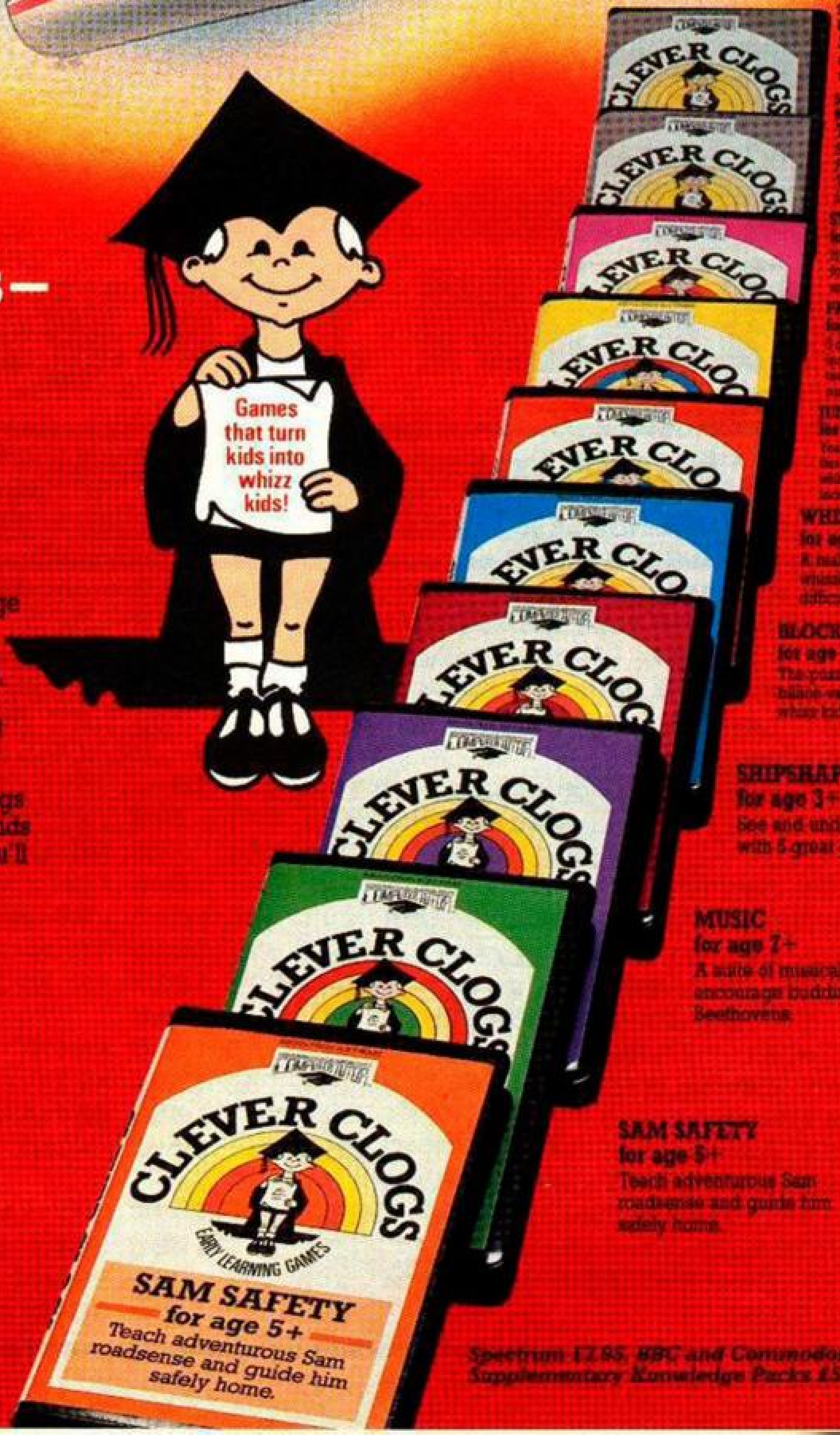
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Spectrum lessons

Mike Edmunds gives learning programs the final exam!

Five Little Ducks, Nine Currant Buns, Goldilocks, Red Riding Hood, The Enormous Turnip, The Magic Shop, Mister Mac's Day, Hansel and Gretal

The Learning Box Series
Spectrum 48K
£9.95 each
Arrow, 17-21 Conway Street, London W1P 6JD.

When home micros first began to appear, one of their major selling points was the fact that children would be able to continue their education at home. In reality, this claim proved less than accurate, not because of hardware limitations but because the software available did little at the time to inspire prospective buyers. Happily however, this situation has changed and although a lot of mediocre material still manages to get published, a few names are earning a reputation for quality educational software. One such is Fiveways Software whose latest offering for the home/educational market is 'The Learning Box' series published by Arrow.

The series consists of eight titles, each based upon a familiar story or nursery rhyme. They are designed to help childen develop and extend upon basic reading and number skills. Four of the titles: 'Five Little Ducks'? 'Nine currant Buns, 'Goldilocks' and 'Red Riding Hood' are for children up to six years of age. The remaining titles, 'The Enormous Turnip', 'Hansel and Gretel', 'Mr. Mac's Day' and 'The Magic Shop' are for childen up to the age of eight.

Each program costs £9.95 and, for the price you get a durable video-style cassette box which contains a storybook, parents guide, keyboard overlay and a tape which has the story on one side (narrated by Toni Arthur) and the program itself. The main emphasis throughout the series is one of structured progression and the activities are intended to be worked through over a length of time rather than as a one-off, repeatable activity.

Each program offers a wide range of options, with anything from four to seventeen activities. These are intended to be used initially with the parent sitting alongside the child, but are structured so that even the youngest child should, quite rapidly, be able to work unaided. This aspect is reinforced by use of the double-sided overlays, which divide the keyboard into coloured sections, thus avoiding the need for the young learner having to search for specific keys.



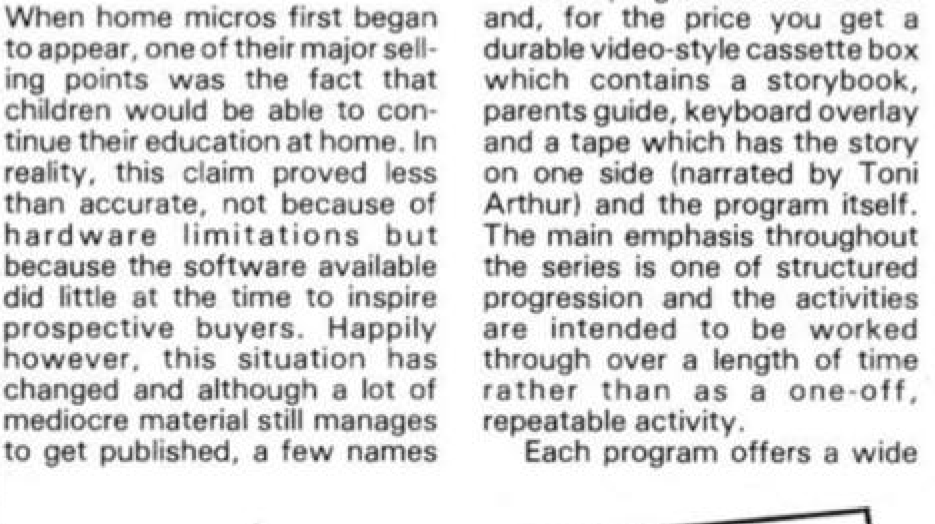
Quality

An indication of the quality of the programs is seen as soon as the colourful loading page appears — bright, appealing graphics indicate the fun to come! Upon loading, a large-print 'menu-style' option sheet details the range of activities available — Fiveways have designed their own character set and the alphanumerics are large, colourful and nicely formed. This attention to detail is common to all the programs and the standard of graphics, colour and sound throughout is excellent!

For the youngest children the first title is **'Five Little Ducks'** which is divided into two sections; Early Numbers and Counting, with five activities in each. Early Numbers deals with grouping, colour matching and one-to-one correspondence. Counting makes use of the little ducks in the title to demonstrate sequences and numbers up to five. Errors are treated with doleful 'quacks' and the child must try that part of the activity again. Variations on this theme should lead gradually to the child's recognition and understanding of numbers up to five.

'Nine Current Buns' is subtitled 'I can do sums' and it provides seventeen activities to demonstrate the stages of addition and subtraction as well as simple sums. A novel feature, which typifies the 'fun to do' approach, is provided by animated '+' and '–' signs. This, combined with many varied objects, such as friendly currant buns or flapping seals, provides an amusing yet effective way of reinforcing the basic concepts involved.

'Red Riding Hood' (I can read words) uses tried and tested educational techniques such as matching pictures, matching letters, word snap and picture snap as an *introduction to the* recognition of letters and words,



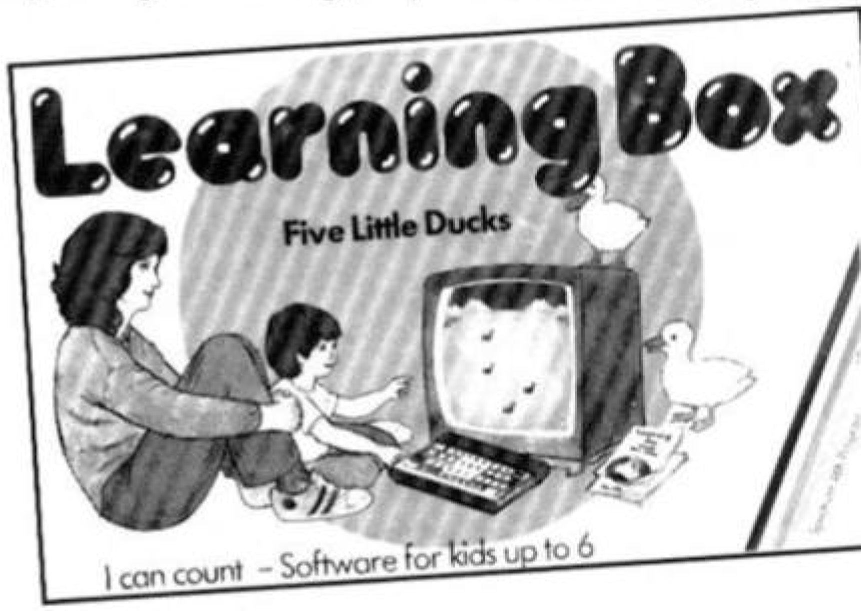
thereby providing a sound basis for reading skills. Characters and events from the stories of both Red Riding Hood and Goldilocks are used in an entertaining way and the child can choose to work alone, play against a friend, or play against the computer. The speed of the program in self-adjusting to cater for the differing abilities of the users. This program is full of little surprises and a child cannot fail to be motivated by the sight of Little Red Riding Hood stamping her feet in anger at a wrong answer — to the obvious delight of the hungry looking wolf beside her!

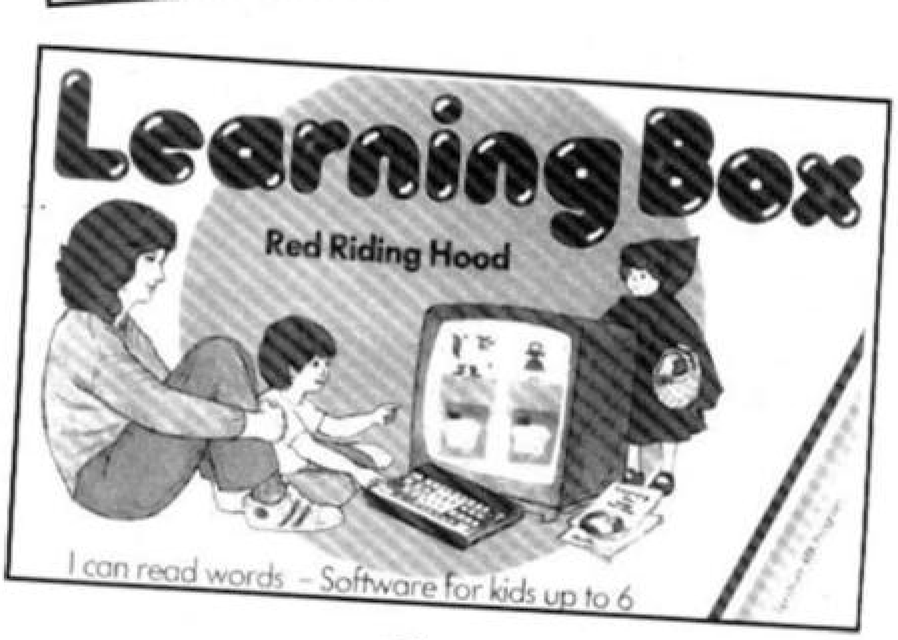
Along similar lines is **'Goldilocks'** (I can read sentences) which also has two sets of vocabulary and introduces groups of words and simple sentences.

For the older child is **'The Enormous Turnip'**, which introduces 'word making' using a cheeky little mouse to help the old man pull up his turnip. Exercises cover initial sounds, sound blends and simple spelling, all of which are designed to encourage the child's word building skills.

'The Magic Shop' is intended to assist in the understanding of money and its use. This is perhaps the weakest of the programs in that the progression of activities is not very clearly defined and initially a lot more parental guidance is required. The 'number line' used is also rather confusing and not as clearly defined as it might be. However, having said that, the program is nevertheless a useful aid for a child to reinforce the idea of buing articles and reciveing change. It is up to date, including the 20p and £1 coins, but perhaps does not fully achieve it's aim even though the idea of buying and concocting magic potions is undeniably self-motivating!

'Mr. Mac's Day' helps the child to tell the time. This is done by, amongst other things, helping forgetful Mr. Mac to do the right things at the right time....woe betide you if you make him arrive for work in his best kilt! Further activities include 'Driving the engine' (and reaching the destination on time) as well as exercises on Digital Clocks and the 12 and 24 hour clock. This program causes my own (very minor) criticism... there is no provision for adjusting the time backwards in the event of overshooting the time you actually want. (Mind you — I always seem to have the same trouble with my digital watch!) The graphics in this program however more than make up for the minor quibble...they are first rate! — even to the extent of Mr. Mac doing a Highland Fling to the skirl of the bagpipes!

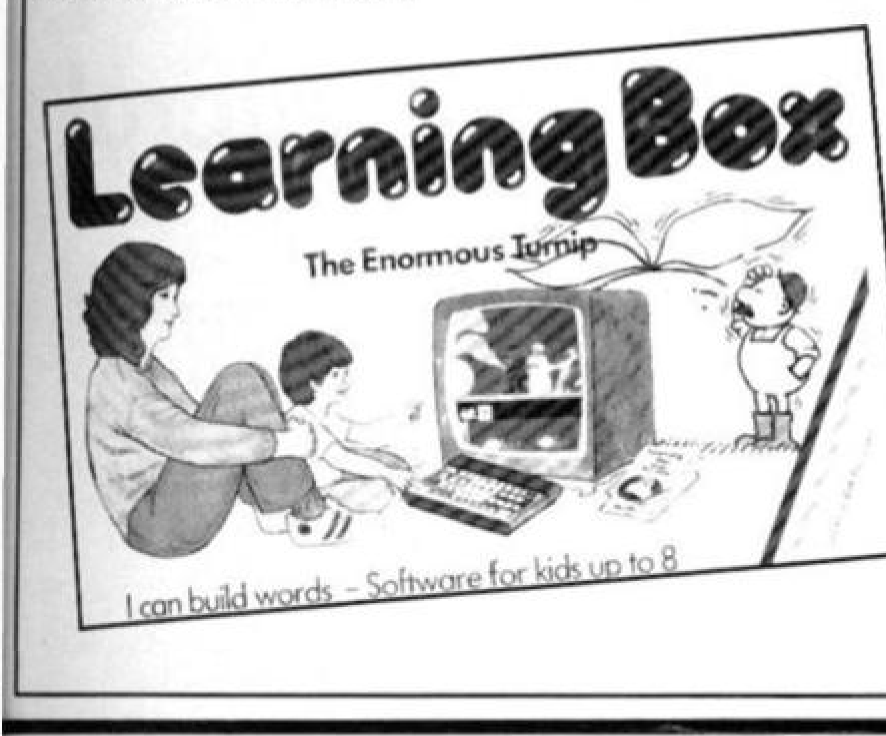




Finally to my favourite of the bunch — **'Hansel and Gretal'**. This is a series of graded activities to encourage word building and spelling using techniques such as 'Make a word' or 'Mend a word.' Again the exercises progress gradually and use a wide range of vocabulary from the story to develop word building skills. The final activity is a novel version of 'hangman' which is harder than it looks. However, I must admit that this program is my favourite for the simple reason that it contains some of the most imaginative graphics that I have ever seen in an educational program. (Wait till you see the way that the wicked witch gets stuffed into her own oven!)

Overall these are value-for-money packages with a wealth of activities that will help the learner develop and improve upon basic skills. The Parents Guide also gives plenty of suggestions as to how to help the child and extend upon the subjects covered. This is one of the best sets of educational software I have yet seen for the Spectrum.

Full marks Fiveways and Arrow for some excellent work — to the top of the class!







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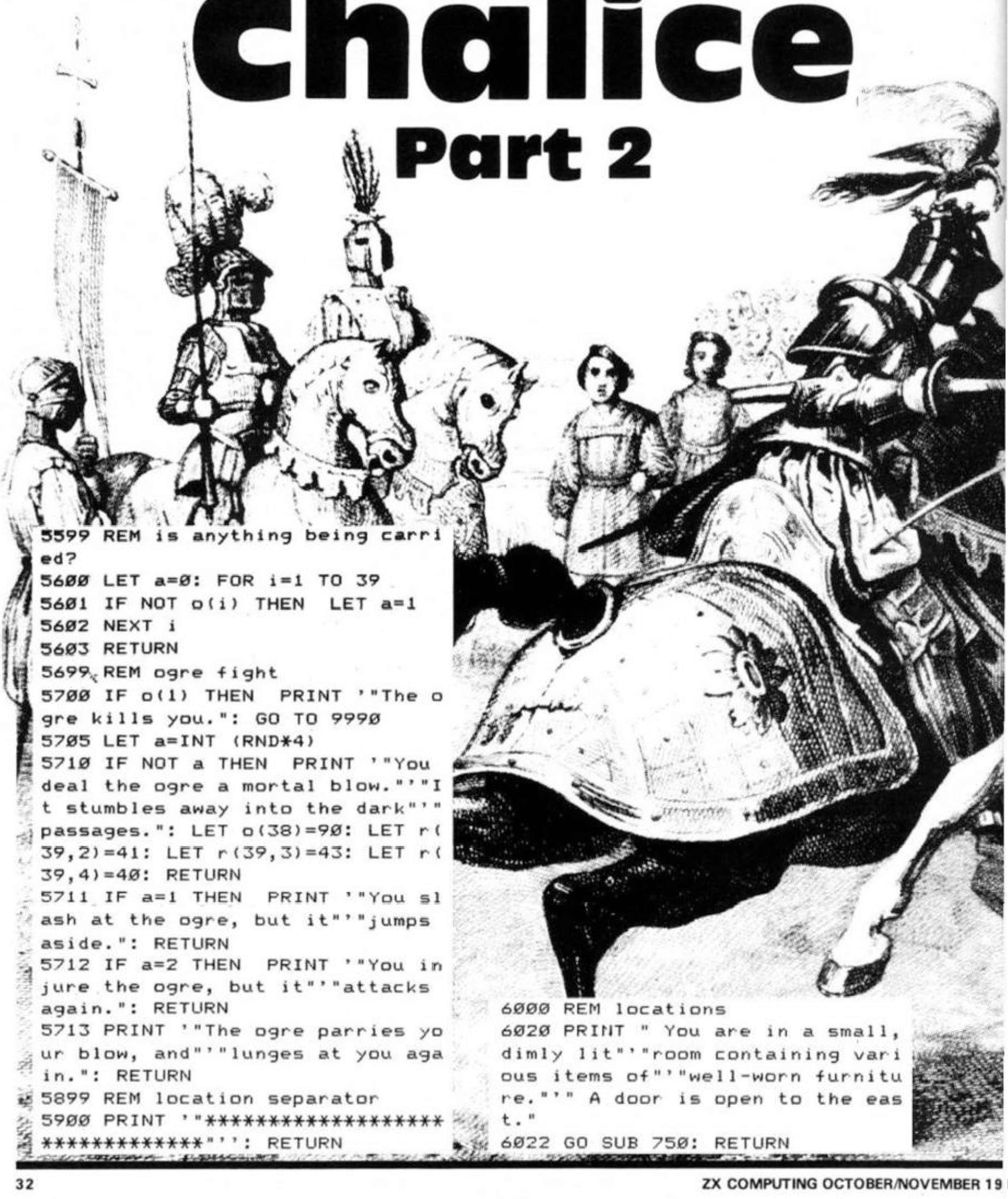
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The Golden Chalice

Part 2



```
5599 REM is anything being carri
ed?
56ØØ LET a=Ø: FOR i=1 TO 39
56Ø1 IF NOT o(i) THEN  LET a=1
56Ø2 NEXT i
56Ø3 RETURN
5699 REM ogre fight
57ØØ IF o(1) THEN  PRINT '"The o
gre kills you.": GO TO 999Ø
57Ø5 LET a=INT (RND*4)
571Ø IF NOT a THEN  PRINT '"You
deal the ogre a mortal blow."'"I
t stumbles away into the dark"'"
passages.": LET o(38)=9Ø: LET r(
39,2)=41: LET r(39,3)=43: LET r(
39,4)=4Ø: RETURN
5711 IF a=1 THEN  PRINT '"You sl
ash at the ogre, but it"'"jumps
aside.": RETURN
5712 IF a=2 THEN  PRINT '"You in
jure the ogre, but it"'"attacks
again.": RETURN
5713 PRINT '"The ogre parries yo
ur blow, and"'"lunges at you aga
in.": RETURN
5899 REM location separator
59ØØ PRINT '"******************
*************"'': RETURN
6ØØØ REM locations
6Ø2Ø PRINT " You are in a small,
dimly lit"'"room containing vari
ous items of"'"well-worn furnitu
re."'" A door is open to the eas
t."
6Ø22 GO SUB 75Ø: RETURN
```

As promised, we bring you the second and final part of our king-size Spectrum adventure.

To recap on the notation for the Golden Chalice program, as published with part 1 in the August/September issue of *ZX Computing*, here is a brief description of the program.

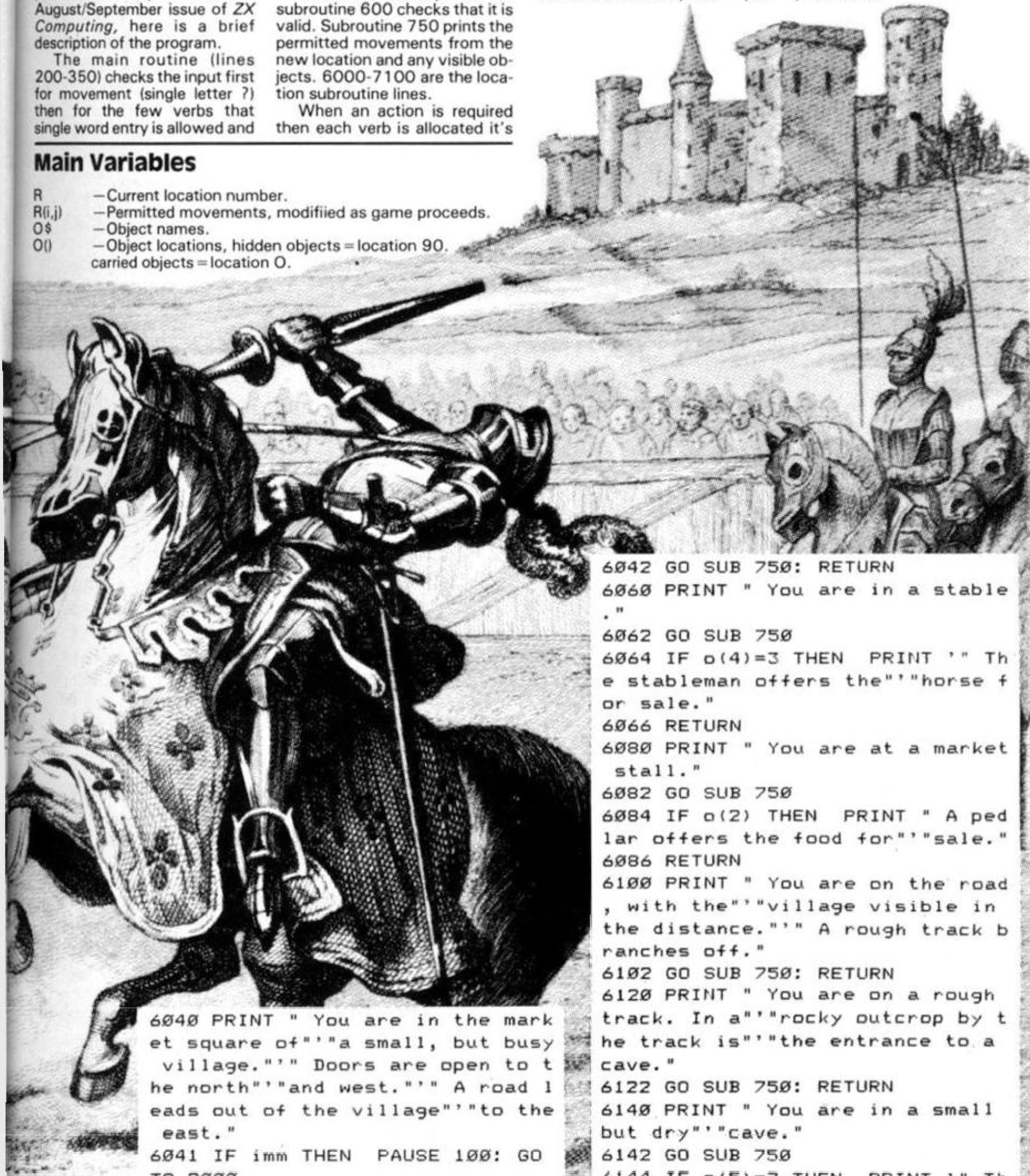
The main routine (lines 200-350) checks the input first for movement (single letter ?) then for the few verbs that single word entry is allowed and finally for the standard two word (Verb-Noun) entry.

If movement is required then subroutine 600 checks that it is valid. Subroutine 750 prints the permitted movements from the new location and any visible objects. 6000-7100 are the location subroutine lines.

When an action is required then each verb is allocated it's own subroutine which checks all the conditions necessary for that action to take place — provided that both verb and noun have been recognised by the input routine!

Main Variables

R	—Current location number.
R(i,j)	—Permitted movements, modifiied as game proceeds.
O$	—Object names.
O()	—Object locations, hidden objects = location 90. carried objects = location O.



```
6Ø4Ø PRINT " You are in the mark
et square of"'"a small, but busy
 village."'" Doors are open to t
he north"'"and west."'" A road l
eads out of the village"'"to the
 east."
6Ø41 IF imm THEN PAUSE 1ØØ: GO
TO 9ØØØ
6Ø42 GO SUB 75Ø: RETURN
6Ø6Ø PRINT " You are in a stable
."
6Ø62 GO SUB 75Ø
6Ø64 IF o(4)=3 THEN PRINT '" Th
e stableman offers the"'"horse f
or sale."
6Ø66 RETURN
6Ø8Ø PRINT " You are at a market
 stall."
6Ø82 GO SUB 75Ø
6Ø84 IF o(2) THEN PRINT " A ped
lar offers the food for"'"sale."
6Ø86 RETURN
61ØØ PRINT " You are on the road
, with the"'"village visible in
the distance."'" A rough track b
ranches off."
61Ø2 GO SUB 75Ø: RETURN
612Ø PRINT " You are on a rough
track. In a"'"rocky outcrop by t
he track is"'"the entrance to a
cave."
6122 GO SUB 75Ø: RETURN
614Ø PRINT " You are in a small
but dry"'"cave."
6142 GO SUB 75Ø
6144 IF o(5)=7 THEN PRINT '" Th
```

```
e hermit says: To reach your"'"g
oal you must enter the"'"roggoth
's lair. But beware!"
6146 RETURN
6160 PRINT " You are on the high
 road."'"A rough track branches
northward"'" In the distance you
 see the"'"Wood Perilous."
6162 GO SUB 750: RETURN
6180 PRINT " You are at a bridge
 by a"'"stream which runs along
the edge"'"of the Wood Perilous.
"
6182 GO SUB 750: RETURN
6200 PRINT " You are on the bank
 of the"'"stream on the western
edge of"'"the Wood."
6202 GO SUB 750: RETURN
6220 PRINT " Here the stream run
s into a"'"clear, sparkling pool
."
6222 GO SUB 750
6224 IF o(7)=11 THEN  PRINT " Th
e knight lies on the grass"'"som
e yards from the pool,"'"sorely
wounded. He groans and"'" asks f
or water."
6226 RETURN
6240 PRINT " You are in the Wood
. To the"'"north is a door."
6242 GO SUB 750
6244 RETURN
6260 PRINT " Inside the hut is a
n old woman"'"who sits at a spin
ning wheel."'" She says: I am al
l-seeing."'"SAY what you require
."
6262 GO SUB 750: RETURN
6280 PRINT " You are in the dept
hs of the"'"Wood, at a joining o
f several"'"infrequently trodden
 paths."
6282 GO SUB 750: GO SUB 9200: RE
TURN
6300 PRINT " You are among dense
 undergrowth"'"where the paths a
re difficult"'"to follow."
6302 GO SUB 750: GO SUB 9200: RE
TURN
6320 PRINT " You arrive at a sma
ll and"'"gloomy clearing."
6322 GO SUB 750
6324 IF o(12)=16 THEN  PRINT '"T
he wolf leaps forward and"'"atta
cks you."
6326 IF o(1) AND o(12)=16 THEN
PRINT " You are unable to resist
 his"'"attack and are severely i
njured."'"You die two days later
...": GO TO 9990
6330 RETURN
6340 PRINT " You are by the stre
am. The Wood"'"is to the east."
6342 GO SUB 750: RETURN
6360 PRINT " The stream here ent
ers a narrow"'"rocky valley."
6362 GO SUB 750: RETURN
6380 PRINT " You reach a high ro
ck face."'"The stream gushes for
th from"'"a narrow crack at its
base."
6381 IF o(37)=19 THEN  PRINT '"O
n the ground is a crumpled"'"pie
ce of paper resembling a map."
6382 GO SUB 750: RETURN
6400 PRINT " You are following a
 path among"'"tall ferns."
6402 GO SUB 750: RETURN
6420 PRINT " You come to a sheer
 wall of"'"rock. At the foot of
the rock"'"face is a cave entran
ce."
6421 GO SUB 750
6422 IF o(14)=21 THEN  PRINT '"Y
ou are in urgent need of"'"advic
e!! Press any key."
6424 IF o(14)=21 AND INKEY$="" T
HEN  GO TO 6424
6426 IF o(14)=21 THEN  CLS : PRI
NT ''" You may not know much abo
ut"'"the roggoth - and this is n
ot"'"surprising, since no one ha
s"'"ever encountered one and liv
ed"'"to tell the tale!"''" All t
hat is known is that the"'"creat
ure is virtually"'"indestructabl
e. It pursues its"'"prey relentl
essly, once aroused."'" Your onl
y hope lies in speed."
6428 RETURN
6440 PRINT " The trees are close
 together"'"and the light poor.
The ground"'"underfoot is wet an
d slippery."
6442 GO SUB 750: GO SUB 9200: RE
TURN
6460 PRINT " You pass among slim
y, moss-"'"-covered tree trunks,
 picking"'"your way carefully ac
ross the"'"boggy ground."
6462 GO SUB 750: RETURN
6480 PRINT " The trees thin out
here, and"'"the way to the south
 is blocked"'"by a high cliff. A
 stream"'"tumbles down the cliff
,"'"splashing down by the side o
f"'"a cave entrance."
6482 GO SUB 750: RETURN
```

```
6500 PRINT " You are in a foul-s
melling"'"cave - it is clearly t
he"'"dwelling of a troll."
6502 GO SUB 750
6504 IF o(13)=25 THEN  PRINT '"
You encounter the troll as he"'"
is leaving the cave."
6506 IF o(13)=25 THEN  PRINT " T
he troll grabs you, pounds"'"you
r head against the cave wall,"'"
and makes a pie with you later"'
"in the day.....": GO TO 9990
6507 RETURN
6520 PRINT " You are in a large
cavern -"'"the living quarters o
f the"'"roggoth."
6521 IF o(2)<>90 THEN  PRINT '"Y
our adventures have exhausted"'"
you - you are too weak to"'"cont
inue."
6522 GO SUB 750
6523 RETURN
6540 PRINT " You are in a dark a
nd narrow"'"passage."
6542 GO SUB 750: RETURN
6560 PRINT " You are in a small
dark"'"chamber."
6562 GO SUB 750: RETURN
6580 PRINT " You are in a narrow
 passage."'"In the dim light you
 see"'"rough stone steps."
6582 GO SUB 750: RETURN
6600 PRINT " You are in a very d
ark chamber."'"Steps lead up and
 down."
6602 IF light AND NOT o(10) THEN
  PRINT " In the lamplight you s
ee a"'"fearful drop into a chasm
 to"'"the north."
6604 GO SUB 750: RETURN
6620 PRINT " You are in a spacio
us cavern."
6621 IF NOT light OR o(10) THEN
 PRINT "It is too dark to see an
ything"'"clearly."
6622 IF light AND NOT o(10) THEN
  PRINT " In the lamplight you s
ee a"'"fearful drop into a chasm
 to"'"the north. In a recess in
the"'"cavern wall you see an iro
n"'"door."
6624 GO SUB 750: RETURN
6640 PRINT " You are in a passag
e which"'"slopes slightly downwa
rds to"'"the east."
6641 IF NOT light OR o(10) THEN
 PRINT "It is too dark to see an
ything"'"else."
6642 IF light AND NOT o(10) THEN
  PRINT " In the lamplight you s
ee a"'"frightful drop into a cha
sm to"'"the east."
6646 GO SUB 750: RETURN
6660 PRINT " You fall into a bot
tomless"'"chasm."
6661 PAUSE 50
6662 BORDER 0: PAPER 0: INK 7: C
LS
6664 PRINT " You fall...": FOR i
=1 TO 5: PRINT '"and fall...."':
 PAUSE 50: NEXT i: GO TO 9990
6680 GO TO 6660
6700 GO TO 6660
6720 PRINT "You stand at the foo
t of a"'"flight of roughly carve
d stone"'"steps. A dim greenish
light"'"can be seen to the east.
"
6722 GO SUB 750: RETURN
6740 PRINT " You stand in a colo
ssal cavern"'"on the shore of an
 underground"'"lake stretching e
astward as far"'"as you can see.
 The roof of the"'"cavern, hundr
eds of feet above"'"you, glows w
ith a pale greenish light."'" Ne
arby are the entrances to"'"two
tunnels."
6742 GO SUB 750: RETURN
6760 PRINT " You are in a small
cave on the"'"lake shore. Furthe
r in, the cave"'"narrows to a me
re crack which is"'"far too narr
ow for you to enter."
6762 GO SUB 750: RETURN
6780 PRINT " You are at the foot
 of a flight"'"of stone steps, a
t a junction"'"of passages."
6782 GO SUB 750
6783 IF o(38)=r THEN  PRINT '"Th
e ogre attacks you.": RETURN
6790 RETURN
6800 PRINT " You are in a dark a
nd narrow"'"passage."
6801 GO SUB 9250
6802 GO SUB 750: RETURN
6820 PRINT " You are at a juncti
on of"'"passages."
6821 GO SUB 9250
6822 GO SUB 750: RETURN
6840 PRINT " You are in a small
cavern"'"which shows signs of ha
ving"'"been once inhabited by so
me"'"creature. High up - and jus
t out"'"of reach, a ledge has be
en"'"carved out of the living ro
ck."
6842 GO SUB 750: RETURN
```

```
6860 PRINT " You squeeze along a
 narrow"'"passage."
6861 GO SUB 9250
6862 GO SUB 750: RETURN
6880 PRINT " You stand in a smal
l cave which"'"has obviously bee
n  occupied by"'"someone-or some
thing-long ago."
6882 GO SUB 750
6884 IF o(33)=44 THEN  PRINT " T
he bench is roughly hewn out"'"o
f solid wood."
6886 RETURN
6900 PRINT " You travel east in
the boat"'"for some time, propel
led by a"'"gentle breeze. But th
e breeze"'"dies, and the boat is
 becalmed"'"on the seemingly lim
itless and"'"utterly still green
 lake."'" Far to the west you ca
n just"'"see the shore you have
left."
6902 IF o(21) THEN  PRINT '" You
 drift aimlessly and die"'"some
days later....": GO TO 9990
6904 GO SUB 750: RETURN
6920 IF NOT o(36) THEN  PRINT "
After rowing for many days"'"tow
ards the east, you land on a"'"r
ocky shore with cliffs which"'"t
ower above you. Steps are"'"carv
ed into the cliff face."
6921 IF o(36) THEN  PRINT "You s
tand on a rocky shore, with"'"cl
iffs which tower above you."'"St
eps are carved into the cliff"'"
face."
6922 IF NOT o(36) THEN  PRINT '"
 A sudden breeze-the first for"'
"days-catches the boat and it"'"
drifts far out into the lake.":
LET o(36)=90: LET o(21)=90: GO S
UB 750: RETURN
6924 GO SUB 750: RETURN
6940 PRINT " You are on the clif
f face. The"'"steps continue upw
ard, with a"'"dizzy sheer drop t
o the rocks"'"below."'"Above you
 see the ruins of an"'"ancient t
emple."
6942 GO SUB 750: RETURN
6960 GO SUB 9300: PRINT " You st
and at the entrance of"'"the leg
endary temple of Ragadan."
6962 GO SUB 750: RETURN
6980 PRINT " You stand in a vast
 hall, with"'"pillars of gold ri
sing upwards"'"to a vaulted ceil
ing."
6982 GO SUB 750
6984 PRINT " A narrow stair rise
s from an"'"alcove in the north
wall."'" A broad stair leads dow
nwards."
6986 RETURN
7000 PRINT " You are in a circul
ar room at"'"the top of a tall t
ower."
7002 GO SUB 750: RETURN
7020 PRINT " You are in a long s
traight"'"corridor."
7022 GO SUB 750: RETURN
7040 PRINT " You stand in a smal
l alcove at"'"the southern end o
f the"'"corridor."
7042 GO SUB 750
7044 IF o(25)=52 THEN  PRINT '"
The book rests in a recess. The"
'"binding is of leather embossed
"'"with beaten gold"
7046 RETURN
7060 PRINT "You stand before a g
olden door,"'"carved with wonder
ful and"'"mysterious designs."
7062 GO SUB 750: RETURN
7080 PRINT " You are in a small,
 stone"'"walled room."
7081 GO SUB 750
7082 IF o(29)=54 THEN  PRINT '"B
efore you, in an alcove, stands"
'"the golden chalice of Ragadan.
"
7086 RETURN
8999 REM end of quest display
9000 CLS : PRINT '" You are gree
ted by rousing"'"cheers from the
 villagers."''"Within minutes th
e square is"'"filled with people
,excited by"'"the news of your r
eturn."''" Before many days are
out, you"'"are crowned king, and
 during the"'"following centurie
s the land"'"prospers as you ste
adily acquire"'"the wisdom of ag
e, while"'"retaining the vitalit
y of youth."
9005 PRINT '"Thus ends the quest
 of the"'"chalice of Ragadan."
9010 IF INKEY$="" THEN  GO TO 90
10
9015 RUN
9099 REM map graphics
9100 BORDER 2: PAPER 6: INK 1: C
LS
9105 PLOT 80,0: DRAW 8,16: DRAW
-8,8: DRAW -8,0: DRAW -8,16: DRA
W -16,0: DRAW -16,16: DRAW -8,0:
 DRAW -8,8: DRAW 8,8: DRAW 8,0:
```

```
DRAW 8,8: DRAW 8,Ø: DRAW 8,8: DR
AW Ø,8: DRAW -8,16: DRAW Ø,8: DR
AW 8,16: DRAW -2,8: DRAW 2,8: DR
AW 8,8: DRAW 8,15
911Ø PLOT 136,Ø: DRAW 8,16: DRAW
 8,Ø: DRAW 2,16: DRAW 6,Ø: DRAW
8,16: DRAW Ø,8: DRAW 8,Ø: DRAW 8
,16: DRAW -8,8: DRAW -4,Ø: DRAW
-12,16: DRAW 8,8: DRAW 8,Ø: DRAW
 8,8: DRAW -16,8: DRAW -8,16: DR
AW 8,8: DRAW 2,8: DRAW -2,8: DRA
W -8,8: DRAW Ø,7
9115 PLOT 72,128: DRAW 4,Ø: DRAW
 4,8: DRAW 4,Ø: DRAW Ø,8: DRAW 4
,8: DRAW -4,4: DRAW -4,-4: DRAW
-4,Ø: DRAW -4,-4: DRAW Ø,-4: DRA
W -4,-4: DRAW Ø,-4: DRAW 4,-8
912Ø PLOT 112,136: DRAW Ø,32: DR
AW -4,-4: PLOT 112,168: DRAW 4,-
4: PLOT 1Ø8,152: DRAW 8,Ø: PLOT
2Ø8,12Ø: DRAW Ø,8: DRAW -4,8: DR
AW 8,Ø,-PI: DRAW -4,-8: PLOT 2Ø4
,128: DRAW 8,Ø
9125 PLOT 188,78: DRAW 4Ø,Ø: DRA
W Ø,2: DRAW -4Ø,Ø: DRAW Ø,-2: PL
OT 188,1Ø4: DRAW 4Ø,Ø: DRAW Ø,2:
 DRAW -4Ø,Ø: DRAW Ø,-2: PLOT 188
,1Ø6: DRAW 2Ø,8: DRAW 2Ø,-8: PLO
T 192,8Ø: DRAW Ø,24: PLOT 194,8Ø
: DRAW Ø,24: PLOT 199,8Ø: DRAW Ø
,24: PLOT 2Ø1,8Ø: DRAW Ø,24: PLO
T 2Ø7,8Ø: DRAW Ø,24: PLOT 2Ø9,8Ø
: DRAW Ø,24: PLOT 215,8Ø: DRAW Ø
,24: PLOT 217,8Ø: DRAW Ø,24: PLO
T 222,8Ø: DRAW Ø,24: PLOT 224,8Ø
: DRAW Ø,24
913Ø FOR i=Ø TO 8 STEP 4: PLOT 8
8,64+i: DRAW 4,4: DRAW 4,-4: DRA
W 4,4: DRAW 4,-4: DRAW 4,4: DRAW
 4,-4: DRAW 4,4: DRAW 4,-4: DRAW
 4,4: DRAW 4,-4: NEXT i
9135 PRINT  INK 2;AT 5,1;"Caves"
;AT 7,2;"of";AT 9,1;"Doom";AT 13
,24;"Ragadan"
914Ø PRINT  INK 1;AT 7,12;"The";
AT 9,11;"Great";AT 11,11;"Lake";
AT Ø,14;"N"
9145 PRINT  INK 2;AT 18,24;"THE"
;AT 2Ø,21;"LOST LANDS"
915Ø IF INKEY$="" THEN  GO TO 91
5Ø
9155 BORDER 7: PAPER 7: INK Ø: C
LS : GO SUB 6ØØØ+2Ø*r: RETURN
9199 REM creepy events in Wood
92ØØ LET a=INT (RND*1Ø)
92Ø1 IF o(14)<>21 THEN  RETURN
92Ø2 IF NOT a THEN  PRINT '"You
hear a rustling in the"'"undergr
owth.": RETURN
92Ø4 IF a=1 THEN  PRINT '"Someth
ing creepy drops from"'"above. Y
ou brush it off.": RETURN
92Ø6 IF a=2 THEN  PRINT '"You he
ar an eerie wailing in the"'"dis
tance.": RETURN
92Ø8 IF a=3 THEN  PRINT '"An arr
ow whistles by, narrowly"'"missi
ng you.": RETURN
921Ø IF a=4 THEN  PRINT '"A snak
e hisses and slithers away": RET
URN
9212 IF a=5 THEN  PRINT '"A frig
htened deer runs past.": RETURN
9214 IF a=6 THEN  PRINT '"You gl
impse a figure among the"'"trees
,but it disappears.": RETURN
9216 IF a=7 THEN  PRINT '"The su
n goes behind a cloud, and"'"the
 forest gloom deepens.": RETURN
922Ø RETURN
9249 REM creepy events in caves
925Ø LET a=INT (RND*1Ø)
9252 IF NOT a THEN  PRINT '"Some
thing scuttles in a corner.": RE
TURN
9254 IF a=1 THEN  PRINT '"A bat
flies past, screeching.": RETURN

9256 IF a=2 THEN  PRINT '"Someth
ing slimy slithers over"'"your f
oot.": RETURN
9258 IF a=3 THEN  PRINT '"You he
ar a faint, unidentifiable"'"sou
nd echoing along the caves.": RE
TURN
926Ø IF a=4 THEN  PRINT '"A cobw
eb brushes your face.": RETURN
9262 IF a=5 THEN  PRINT '"Two gr
een eyes stare at you from"'"a d
ark recess, and disappear.": RET
URN
9264 IF a=6 THEN  PRINT '"You he
ar something crawling"'"along th
e passage behind you.": RETURN
928Ø RETURN
9299 REM temple graphics
93ØØ BORDER 4: PAPER 4: INK Ø: C
LS
93Ø4 PLOT Ø,2Ø: DRAW 8,Ø: DRAW 8
,-4: DRAW 232,Ø: DRAW 7,6: PLOT
16,16: DRAW Ø,4: DRAW 224,Ø: DRA
W Ø,-4: PLOT 24,2Ø: DRAW Ø,4: DR
AW 2Ø8,Ø: DRAW Ø,-4: PLOT 32,24:
 DRAW Ø,4: DRAW 8,Ø: DRAW Ø,4: D
RAW 176,Ø: DRAW Ø,-4: DRAW 8,Ø:
DRAW Ø,-4
93Ø6 PLOT 48,32: DRAW Ø,4: DRAW
8,Ø: DRAW Ø,96: DRAW -4,Ø: DRAW
```

```
0,4: PLOT 80,32: DRAW 0,4: DRAW
-8,0: DRAW 0,96: DRAW 4,0: DRAW
0,4
9307 PLOT 88,32: DRAW 0,4: DRAW
8,0: DRAW 0,96: DRAW -4,0: DRAW
0,4: PLOT 120,32: DRAW 0,4: DRAW
 -8,0: DRAW 0,96: DRAW 4,0: DRAW
 0,4
9308 PLOT 136,32: DRAW 0,4: DRAW
 8,0: DRAW 0,76: DRAW 4,0: DRAW
0,4: DRAW 4,0: DRAW 0,4: DRAW 4,
0: DRAW 0,-4: DRAW 4,0: DRAW 0,-
80: DRAW 8,0: DRAW 0,-4
9309 PLOT 56,132: DRAW 16,0: PLO
T 96,132: DRAW 16,0: PLOT 56,36:
 DRAW 16,0: PLOT 96,36: DRAW 16,
0: PLOT 144,36: DRAW 16,0: PLOT
184,36: DRAW 16,0
9310 PLOT 176,32: DRAW 0,4: DRAW
 8,0: DRAW 0,64: DRAW 4,0: DRAW
0,4: DRAW 4,0: DRAW 0,-4: DRAW 4
,0: DRAW 0,-4: DRAW 4,0: DRAW 0,
-60: DRAW 8,0: DRAW 0,-4
9312 PLOT 40,136: DRAW 96,0: DRA
W 0,4: DRAW -96,0: DRAW 0,-4: PL
OT 48,140: DRAW 0,4: DRAW 8,0: D
RAW 0,4: DRAW 16,0: DRAW 0,4: DR
AW 12,0: DRAW 0,4: DRAW 24,0: DR
AW 0,4: DRAW 4,0: DRAW 0,-12: DR
AW 8,0: DRAW 0,-4: DRAW 8,0: DRA
W 0,-4
9314 PLOT 0,72: DRAW 16,16: DRAW
 16,8: DRAW 8,2: DRAW 8,-2: DRAW
 8,-4: PLOT 72,88: DRAW 16,-8: D
RAW 8,-8: PLOT 112,60: DRAW 8,-4
: DRAW 8,-8: PLOT 120,56: DRAW 1
6,8: DRAW 8,8: PLOT 160,80: DRAW
 8,4: DRAW 8,0: DRAW 8,4: PLOT 2
00,92: DRAW 8,0: DRAW 32,-16: DR
AW 8,0: DRAW 7,4
9316 FOR i=1 TO 11: PRINT  INK 6
;AT 5+i,8;" ▌";AT 5+i,13;" ▌": NEX
T i
9317 FOR i=1 TO 9: PRINT  INK 6;
AT 7+i,19;" ▌": NEXT i: FOR i=1 T
O 7: PRINT  INK 6;AT 9+i,24;" ▌":
 NEXT i
9320 IF INKEY$="" THEN  GO TO 93
20
9322 BORDER 7: PAPER 7: INK 0: C
LS : RETURN
9499 REM title graphics & instr.
9500: BORDER 0: PAPER 1: INK 6:
CLS
9505 PLOT 0,48: DRAW 255,0: PLOT
 96,48: DRAW 16,4: DRAW 8,4: DRA
W 4,4: DRAW 0,12: DRAW -12,8: DR
AW -8,8: DRAW -16,32: DRAW -16,8
: DRAW 112,0: DRAW -16,-8: DRAW
-16,-32: DRAW -8,-8: DRAW -12,-8
: DRAW 0,-12: DRAW 4,-4: DRAW 8,
-4: DRAW 16,-4
9510 PRINT AT 16,9;"████████████
██";AT 17,9;"██THE GOLDEN██";AT
18,9;"██████████████";AT 19,9;"█
██CHALICE███";AT 20,9;"█████████
█████"
9515 PLOT  INK 5;128,88: DRAW  I
NK 5;0,16: DRAW  INK 5;-4,8: DRA
W  INK 5;8,0,-PI: DRAW  INK 5;-4
,-8: PLOT  INK 5;124,104: DRAW
INK 5;8,0
9520 RETURN
9600 PRINT ''" According to lege
nd there"'"existed, in the ancie
nt temple"'"of Ragadan, a golden
 chalice."'"Drinking from the ch
alice was"'"reputed to confer im
mortality."
9602 PRINT '" Unfortunately, ove
r the"'"centuries, the location
of"'"Ragadan has become lost. On
ly"'"the legends remain."
9604 PRINT '"Your quest is to se
ek out the"'"temple,'drink the i
mmortal"'"draught, and return sa
fely home."
9606 IF INKEY$="" THEN  GO TO 96
06: CLS
9607 CLS
9608 PRINT "        INSTRUCTIONS"

9610 PRINT '"To move north, sout
h, east, west"'"up, or down, typ
e:"'"n, s, e, w, u, d"
9616 PRINT '"The following verbs
 should be"'"entered as single w
ords:"'"look, wait, dismount."
9618 PRINT '"The following verbs
 may also be"'"used, but must be
 followed by"'"a noun:"'"open, t
ake, examine, enter,"'"fight, gi
ve, mount, drop, buy,"'"climb."
9620 PRINT "You may also use exp
ressions"'"such as 'climb onto .
....'"'"This list is not exhaust
ive."'"You will have to discover
 the"'"others yourself."
9621 PRINT "To see what you are
carrying: i"
9622 IF INKEY$="" THEN  GO TO 96
22
9623 CLS
9630 RETURN
9989 REM dead heroes come here!
9990 IF INKEY$="" THEN  GO TO 99
90
9991 RUN
```

Slogo

Part 3

David Nowotnik concludes his fascinating series on this adaptation of LOGO.

In this, the final part of the series, I'll be providing you with the last part of my LOGO program for 48K Spectrums, and showing you structured programming with LOGO.

To incorporate the program in this issue with the version you completed last time, first enter the listing in fig. 1. into your computer, then store it on tape. Then, load into your Spectrum the program completed last time (from parts 1 and 2), then MERGE this issue's program into it. Finally, save a copy of the completed program, then you're ready to RUN.

New Commands

There are two additional commands created by the extra routines in this issue. The first is BACKGROUND (BG), which allows you to define the paper colour in specified areas of the screen. Five numbers are required after BACKGROUND to complete the command. Here is an example which you can try:

BACKGROUND 0 0 31 6 5

The first four numbers define the area, a rectangle, to be "painted", and the last number is the colour (0 to 7, as shown on the Spectrum keyboard). The first two numbers are the x and y co-ordinates of the top left point of the area to be coloured. In the example, 0 0 refers to the top left of the screen, unlike the co-ordinates for SET which start at the bottom of the screen. In fact the first two BACKGOUND co-ordinates are the same as the BASIC PRINT AT. The third and fourth numbers of the BACKGROUND command are width and height of the square to be coloured. In the example the number 31 is the full screen width, and the number 6 means six character squares down. The number 5 is the colour cyan, and so, the example given will "paint" a cyan block at the top of the screen. In an example later on, the same command will create the sky in a scene which will be created with LOGO commands.

The other new command in this issue is LIST. It will list to screen or printer a LOGO program. But, as I haven't yet explained how to create a LOGO program, you won't yet have anything to list!

Defining Logo Commands

LOGO programs are made be creating new commands from the commands that LOGO already understands. You can create a new command using DEFINE (DF). Most versions of LOGO use TO instead of DEFINE, but I've used the latter as it is more explanatory. You complete the DEFINE command with the new command name, which must be different from all the commands currently available to LOGO. As an example, let's tell the computer how to draw a box; we'll define a command called BOX. First enter the command:

DEFINE BOX (or DF BOX)

The screen will clear after the computer has checked that the command BOX doesn't already exist. You'll get the message 'DEFINE BOX' at the top of the screen, and the usual 'W:' at the base of the screen.

There is no standard way of defining new commands in LOGO; there are probably as many different ways as there are versions of LOGO. So the instructions that follow just happen to be the way I have decided to allow the definition of new commands.

To define our box, enter the command:

RP 4 [FD 40 RT 90]

and press ENTER.

That line will appear at the top of the screen with a line number of zero. The line number is not used by LOGO; I've just added it to identify lines in case we want to make any changes. In any one definition, you can enter up to 10 lines, but no line can be longer than 28 characters. For our BOX definition, all we need is the one line already entered, so we tell the computer we've

Fig. 1. The program listing

```
 11Ø DATA 18,24,1
 14Ø DATA "LI",61ØØ,"BG",65ØØ
 24Ø DATA "LIST",61ØØ,"BACKGROUN
D",65ØØ
61ØØ REM   LIST
61Ø5 IF def<1 THEN  RETURN
611Ø PRINT #1;"LIST - To Screen
or Printer?"
6115 LET z$=INKEY$: IF z$="" THE
N  GO TO 6115
612Ø IF z$="S" THEN  LET li=1: G
O TO 62ØØ
6125 IF z$="P" THEN  LET li=2: G
O TO 614Ø
613Ø GO TO 6115
614Ø CLS : PRINT "Printer listin
g - please wait"
6145 OPEN #2,"p"
615Ø FOR j=1 TO def: GO SUB 63ØØ
6155 PRINT : NEXT j
616Ø OPEN #2,"s": RETURN
62ØØ FOR j=1 TO def
62Ø5 CLS : PRINT #1;"Please Wait
"
621Ø GO SUB 63ØØ
6215 IF INKEY$="" THEN  GO TO 62
15
622Ø NEXT j: RETURN
63ØØ LET ed=j: GO SUB 58Ø5
63Ø5 LET y$=w$(j+n)
631Ø PRINT "Definition - ";y$''
6315 GO SUB 5955: RETURN
65ØØ REM   BACKGROUND
65Ø5 GO SUB 12ØØ: IF err>Ø THEN
 RETURN
651Ø IF a<Ø OR a>31 THEN  LET er
r=2: RETURN
6515 LET col=a
652Ø GO SUB 12ØØ: IF err>Ø THEN
```

```
 RETURN
6525 IF a<0 OR a>21 THEN  LET er
r=2: RETURN
6530 LET row=a
6535 GO SUB 1200: IF err>0 THEN
 RETURN
6540 IF a<0 OR (a+col)>31 THEN
LET err=2: RETURN
6545 LET width=a
6550 GO SUB 1200: IF err>0 THEN
 RETURN
6555 IF a<0 OR (a+row)>21 THEN
LET err=2: RETURN
6560 LET height=a
6565 GO SUB 1200: IF err>0 THEN
 RETURN
6570 IF a<0 OR a>7 THEN  LET err
=2: RETURN
6575 FOR i=row TO row+height
6580 FOR j=col TO col+width
6585 LET at=22528+32*i+j
6590 LET ll=PEEK at
6595 LET lk=INT (ll/8): LET ll=l
l-8*lk
6600 POKE at,ll+8*a
6605 NEXT j: NEXT i
6710 RETURN
```

finished by entering END. You'll get a message to tell you that the new command BOX has been stored, then you're back to a clean sheet of paper, and the 'W:' symbol. The LOGO program will now accept BOX as a command; try it!

You can include in your definitions already defined commands. As an example, define another command PATTERN, as follows:

```
DEFINE PATTERN
RP 8 [BOX RT 45]
END
```

When complete, enter PATTERN as a direct command; you'll get a pattern based on the BOX routine you defined. Fig.2. contains another command called MOVE which also uses BOX. Define the command as before, then enter MOVE as a direct command. This definition uses several commands which were described in parts 1 and 2.

Editing commands

The pattern created PATTERN wasn't particularly exciting; we could change PATTERN to improve it. To do this we use the command EDIT. The syntax is EDIT PATTERN. Once you have entered this command, the computer will spend a few moments searching for PATTERN, then reformatting, ready for changes to be made. The definition will reappear on the screen as you entered it (apart from END). At the bottom of the screen is a menu of editing options.

- Option 1 is EDIT. It will allow you to change a line. Enter the line number of the line you wish to change, and re-enter the line as you want it.
- Option 2, INSERT allows you to insert another line between two lines of the screen. Remember, you cannot exceed a total of ten lines, so you can insert a line if you have 9 lines or less in your definition. If you opt to insert a line, say number two, then the previous line two becomes number 3, 3 becomes 4, and so on.
- DELETE (option 3) allows you to delete a line.
- REMOVE (option 4) will remove the whole definition. Pressing 5 will return you to normal command ('W:').

```
DEFINE MOVE
PU XY 50 PD BOX
PU SX 120 PD BOX
PU SX 190 PD BOX
END
```

Fig.2. Definition of the command MOVE

So, to EDIT the command PATTERN, you will want to change line zero. Press 1 to get the EDIT option, and press 0 to indicate that it is line 0 which you want to replace. Then enter:

```
RP 12 [BOX RT 30]
```

Press 5 to exit the edit routine, enter the direct command DRAW to clear the screen and reset the turtle, then try PATTERN again.

LOGO Structures

By now you should already have an idea of how programs are built up in LOGO. Each definition should be quite independant; you should check it out before moving on to the next definition. This is structured programming. It has the advantage of being easier to follow what is happening (than, for example, 'unstructured' BASIC), so it should be easier to correct any mistakes. Programs written in this way are also much easier for others to understand. The BBC machine's PROCEDURE and the QL's DEF PRO also allow programs to be structured in a similar way.

To start you off in LOGO programming, fig.3. contains a listing, obtained by the LIST command. When entering a LOGO program, remember to enter one definition at a time (end each with END, which is not shown in the listing), then test it and edit as necessary before moving onto the next. In the example program, notice that the command SCENE is the command which uses all the other commands in its definition. It is the command which is central to the operation of the program; you operate the whole program (when it's all in the computer) by entering the direct command SCENE. In this way LOGO differs from BASIC. Its programs will not start with a single RUN command; they start with a defined command which is the 'core' of the program.

Fig.3. An example LOGO program

```
Definition - SKY

0  BG 0 0 31 5 5

Definition - SUN

0  PU XY 40 160 PC 6 PD

1  SX 42 PU XY 38 159 PD

2  SX 44 PU XY 37 158 PD

3  SX 45 PU XY 37 157 PD

4  SX 45 PU XY 38 156 PD

5  SX 44 PU XY 40 155 PD

6  SX 42 PU

Definition - GROUND

0  BG 0 6 31 14 4

Definition - HOUSE

0  BG 20 10 5 5 2

Definition - DOOR

0  BG 22 13 1 2 1
```

```
Definition - WINDOWS

Ø  BG 21 11 Ø Ø 7

1  BG 24 11 Ø Ø 7

Definition - ROOF

Ø  PU XY 16Ø

1  96 PC Ø

2  PD SH 45 FD 33 RT 9Ø FD 33

Definition - SCENE

Ø  SKY SUN

1  GROUND TREE

2  HOUSE ROOF DOOR WINDOWS

3  PU XY 2ØØ 16Ø SH 18Ø

4  PD
```

```
Definition - TREE

Ø  PU XY 8Ø 1ØØ PC Ø PD

1  SH 9Ø RP 8 [ FD 7 LT 45 ]

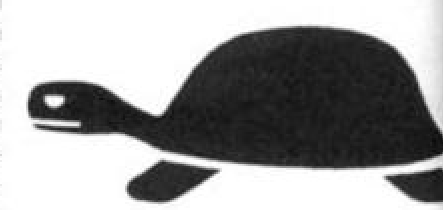
2  FD 2

3  RT 9Ø FD 3Ø LT 9Ø FD 1

4  LT 9Ø FD 3Ø RT 9Ø FD 1

5  RT 9Ø FD 3Ø
```

There is more to LOGO than the aspects I have covered in this series. LOGO also uses variables; it allows decision making with IF. . . THEN. . . ELSE structures; and it permits text handling. If you want to know more about LOGO there are several good book available (for example LOGO Programming by Peter Ross). Despite the limitations of my program, I hope you have gained an insight into the



fascinating possibilites that LOGO is able to offer as an introduction to programming to young and old, or simply, as an easy to use graphics creation package.

Light Screen Designer

Part 3

Toni Baker completes the structure of our Spectrum graphics package, and describes the cursors generated by the program.



In this part of the series we tie up all the loose ends (and leave a few more in the process). Once you have part three, the program will be unified and even partially usable — no longer a fragmented assortment of meaningless subroutines. The building blocks we constructed in the first two parts will be drawn together, (to become a foundation in whose structures should be evident) the organisation of the, as yet, unfinished whole. We start off part three with two rather weird subroutines, but we quickly progress to the initialisation and main loop of the program.

Cursor positions

As we explained earlier, cursor positions are held in four registers: B and C, which store the row and column numbers respectively and register pair HL, which stores the address of the byte within the display file which contains the given pixel. These four bytes may be stored in memory in the order LHCB, so bytes one and two between them contain an address, byte three contains the column number, and byte four contains the row number. We also have the additional convention that byte four may contain the value FF — this is just a signal meaning "this cursor is not in use"; The following subroutine is used to give initial values to some of the cursors. It performs the following task: *if* the cursor is not in use, *then* reset the cursor to co-ordinates 0,0. It assumes that HL is already pointing to byte four.

Origin, marker and cursor

I'd like to introduce you to three cursors now. They are called ORIGIN, MARKER and CURSOR. The second one — MARKER — is not always used, but ORIGIN and CURSOR always are. Basically, ORIGIN marks the start of the line, and CURSOR marks the end. Each of these cursors is stored amongst the program variables between DB00 and DB41. Each occupies four bytes — ORIGIN from

```
                                ORG DDA3
34        RES_CURSOR            INC (HL)            Is byte four FF?
200E                            JR NZ,RC_EXIT       Jump if not, restoring value of byte.
2B                              DEC HL
2B                              DEC HL
2B                              DEC HL              Point to byte one.
3600                            LD (HL),00
23                              INC HL
3640                            LD (HL),40          Specify cursor address 4000h (top left hand
                                                    corner of screen).
23                              INC HL
3600                            LD (HL),00          Specify column number zero.
23                              INC HL
3601                            LD (HL),01          Specify row number zero (because of next
                                                    instruction).
35        RC_EXIT               DEC (HL)
C9                              RET
```

Cursor initialisation subroutine.

		ORG DDB6	
D5	DR_CURSORS	PUSH DE	
210CDB		LD HL,ORIGIN	HL: contains address of program variable named ORIGIN.
0603		LD B,03	
C5	DCS_LOOP	PUSH BC	
5E		LD E,(HL)	
23		INC HL	
56		LD D,(HL)	DE: = address of cursor within display file.
23		INC HL	
4E		LD C,(HL)	C: = column number of cursor position.
23		INC HL	
46		LD B,(HL)	B: = row number of cursor position.
23		INC HL	Point HL to next variable.
78		LD A,B	A: = row number, or FF if cursor not in use.
FEFF		CP FF	
2806		JR Z,DCS_CONT	Jump if cursor not in use.
E5		PUSH HL	
EB		EX DE,HL	HL: = address of cursor.
CD6CDD		CALL DD6C,DR_CURSOR	Draw specified cursor.
E1	DCS_CONT	POP HL	HL: points to next variable.
C1		POP BC	B: = loop count.
10E9		DJNZ DSC_LOOP	
D1		POP DE	Leave original DE unaltered.
C9	RET		

Routine to draw each of the three cursors, ORIGIN, MARKER and CURSOR.

DB0C to DB0F, MARKER from DB10 to DB13, and CURSOR from DB14 to DB17. This next subroutine draws each of the three cursors onto the screen (if they are in use). It relies upon the subroutine DR_CURSOR which was listed in part two.

Calling the program

Now we come to the START of the program. The whole program may be run simply by calling the machine code from the START address. In hex, this address is DDD5, but by an absolutely astounding coincidence (what?) the START address in decimal is the highly memorable 56789. The BASIC instruction RANDOMIZE USR 56789 will call upon "Light Screen Designer" to do its work. To use this program you have nothing to remember except 56789. Got it?

In fact, USR 56789 can be used for two entirely different reasons — to begin a picture, or to CONTINUE with a picture, since with this program you are free to hop back and forth between BASIC and machine code as much as you wish. Note that a BASIC CLS instruction is needed before a new picture is started.

The program distinguishes between the two different forms of start by quite an ingenious method. To BEGIN with, none of the cursors will be self-consistent (that is — if HL says one thing, BC will say another). Whereas, if a drawing is being continued then each cursor *will* be consistent.

The program uses a total of sixteen different cursors. Each of them occupies four bytes and each of them lives between DB00 and DB3F. Watch how the initialisation sequence works. You may find it helpful to look at at the top part of Figure One in order to follow the program through.

Complete program initialisation subroutine.

		ORG DDD5	(decimal 56789)
CDCCDC	START	CALL DCCC,MESSAGE	
01		DEFB 01	Print message "Light Screen Designer".
DD2140DB		LD IX,DB40	Initialise IX as required.
CDB016		CALL 16B0,SET_MIN	Maximise spare RAM space.
2100DB		LD HL,ORIGIN2	Point HL to first program variable.
0610		LD B,10	
C5		PUSH BC	
5E		LSD_LOOP	LD E,(HL)
23		INC HL	
56		LD D,(HL)	DE: = address of cursor, if assigned.
23		INC HL	
4E		LD C,(HL)	C: = column number of cursor, if assigned.
23		INC HL	
46		LD B,(HL)	B: = row number of cursor, if assigned.
78		LD A,B	
FEB0		CP B0	
300A		JR NC,LSD_RESET	Jump if row number out of range.
E5		PUSH HL	
CD41DD		CALL DD41,PIX_ADDR	HL: = address corresponding to row and column numbers.
A7		AND A	
ED52		SBC HL,DE	Set zero flag if this address matches to the one given.
E1		POP HL	HL: points to byte four of program variable.
2802		JR Z,LSD_OK	Jump if cursor position is already assigned.
36FF	LSD_RESET	LD (HL),FF	Signal "cursor not in use."
23	LSD_OK	INC HL	Point to byte one of next program variable.
C1		POP BC	
10E3		DJNZ LSD_LOOP	Repeat for all cursors.
70		LD (HL),B	
23		INC HL	
70		LD (HL),B	Reset (JFLAGS).
210FDB		LD HL,ORIGIN + 3	HL: points to byte four of (ORIGIN).
CDA3DD		CALL DDA3,RES_CURSOR	Reset origin-cursor to 0,0 if not in use.
2E17		LD L,17	HL: points to byte four of (CURSOR).
CDA3DD		CALL DDA3,RES_CURSOR	Reset main-cursor to 0,0 if not in use.

```
CD8E02   LSD_READY   CALL KEY_SCAN           DE:= immediate keyboard scan.
7B                   LD A,E                  A:= key code ignoring shift.
FE20                 CP 20
20F8                 JR NZ,LSD_READY         Wait until "ESCAPE" key pressed.
CD6E0D               CALL 0D6E,CLS_LOWER     Clear lower part of screen to erase message.
```

Main loop program

Now we come to the main loop program. If you take a look at Figure 1 you'll see I've drawn a flow diagram to show how it works. I don't often do flow diagrams but this was one of those rare exceptions where I did. If you follow the workings of the flow diagram you'll see that the cursors are only on the screen whilst waiting for a key to be pressed. Once a key is detected the cursors are erased before any further action is taken. One thing to watch out for though, is the fact that the keys do not repeat automatically. However, the "shift" key activates a repeat facility for the cursor keys only. Can you see how this is achieved?

"Shift" with any other key will result in the possibility of returning to BASIC. Incidently, don't worry about the copying the screen part — all will be revealed later on.

```
                             ORG DE1B
CDB6DD     MAIN_LOOP         CALL DDB6,DR_CURSORS      Draw cursors on screen.
CDB5DC                       CALL DCB5,GET_CHR         DE:= keyboard scan.
CDB6DD     MAIN_LOOP_2       CALL DDB6,DR_CURSORS      Undraw cursors.
2A14DB                       LD HL,(CURSOR)            HL:= address of main-cursor.
ED4B16DB                     LD DE,(CURSOR+2)          BC:= co-ordinates of cursor.
D5                           PUSH DE
7B                           LD A,E                    A:= key code ignoring shift.
FE03                         CP 03
2853                         JR Z,CSR_DOWN             Jump is "cursor down" pressed.
FE04                         CP 04
2840                         JR Z,CSR_LEFT             Jump if "cursor left" pressed.
FE0B                         CP 0B
2846                         JR Z,CSR_UP               Jump if "cursor up" pressed.
FE13                         CP 13
283D                         JR Z,CSR_RIGHT            Jump if "cursor right" pressed.
DDCB0166                     BIT 4,(JFLAGS)high
2014                         JR NZ,ML_ACTION           Jump unless screen requires copying.
210040                       LD HL,4000,D_FILE
1100C0                       LD DE,C000,D_FILE_2
01001B                       LD BC,1B00
EDB0                         LDIR                      Copy screen.
210CDB                       LD HL,DB0C,CURSOR
1100DB                       LD DE,DB00,CURSOR_2
4D                           LD C,L                    Note: BC:= 000C.
EDB0                         LDIR                      Copy cursors.
D1         ML_ACTION         POP DE                    DE:= keyboard scan.
211BDE                       LD HL,DE1B,MAIN_LOOP
E5                           PUSH HL                   Force subroutine return address to be
                                                       MAIN_LOOP.
2142DB                       LD HL,DB42,CMD_ADDRS
14                           INC D
2803                         JR Z,ML_CASE              Jump unless "shift" pressed.
E1                           POP HL                    Balance to stack.
1839                         JR RET_BASIC              Prepare to return to BASIC.
7B         ML_CASE           LD A,E                    A:= key code.
87                           ADD A,A
85                           ADD A,L
6F                           LD L,A                    HL:= points to subroutine address.
4E                           LD C,(HL)
23                           INC HL
46                           LD B,(HL)                 BC:= subroutine address.
C5                           PUSH BC                   Stack:= subroutine address.
2A14DB                       LD HL,(CURSOR)            HL:= main-cursor address.
ED4B16DB                     LD BC,(CURSOR+2)          BC:= main-cursor co-odinates.
C9                           RET                       Call required subroutine.
CD13DD     CSR_LEFT          CALL DD13,LEFT_PIX        Move cursor left.
180D                         JR CSR_STORE
CD1FDD     CSR_RIGHT         CALL DD1F,PIX_RIGHT       Move cursor right.
1808                         JR CSR_STORE
CD29DD     CSR_DOWN          CALL DD29,DOWN_PIX        Move cursor down.
1803                         JR CSR_STORE
CD36DD     CSR_UP            CALL DD36,UP_PIX          Move cursor up.
3805       CSR_STORE         JR C,CSR_EXIT             Jump if cursor cannot move.
2214DB                       LD (CURSOR),HL            Store new cursor position.
ED4316DB                     LD (CURSOR+2),BC          Store new cursor co-ordinates.
D1         CSR_EXIT          POP DE                    DE:=keyboard scan.
14                           INC D
2887                         JR Z,MAIN_LOOP            Loop back unless "shift" pressed.
CBD6DD                       CALL DDB6,DR_CURSORS      Draw cursors on screen.
76                           HALT
76                           HALT                      Wait for 1/25 of a second.
CDC0DC                       CALL DCC0,GET_CHR_2       DE:= keyboard scan.
1883                         JR MAIN_LOOP_2            Loop back.
```

Main program loop.

Returning to BASIC

And now for the final piece of code for this issue . . . This is the RETURN TO BASIC part. It will ask you whether or not you wish to return to BASIC and will do so only if you reply "Y". (You may alternatively reply "N" or "escape"). Incidentally the RETURN TO BASIC option should in fact be available directly (without shift), just by pressing the "escape" button. To set this up, you should POKE address DB82 with A4, and address DB83 with DE. This effectively stores the address of an appropriate RETURN TO BASIC subroutine amongst the COMMAND ADDRESS table which runs between DB42 and DB8F.

The skeleton of the program is now complete. In the next part I shall start filling in some of the functions available.

```
                             ORG DE9E
CDA4DE     RET_BASIC         CALL DEA4,ESCAPE       Ask whether BASIC wanted.
C31BDE                       JP DE1B,MAIN_LOOP      Jump back to main loop if not.
CDCCDC     ESCAPE            CALL MESSAGE
12                           DEFB 12                Print message and await reply.
FE59                         CP "Y"
C0                           RET NZ                 Return unless reply was "Y".
F1                           POP AF                 Empty the stack.
C9                           RET                    Return to BASIC.
```

Subroutine to detect and comply with a RETURN TO BASIC request.



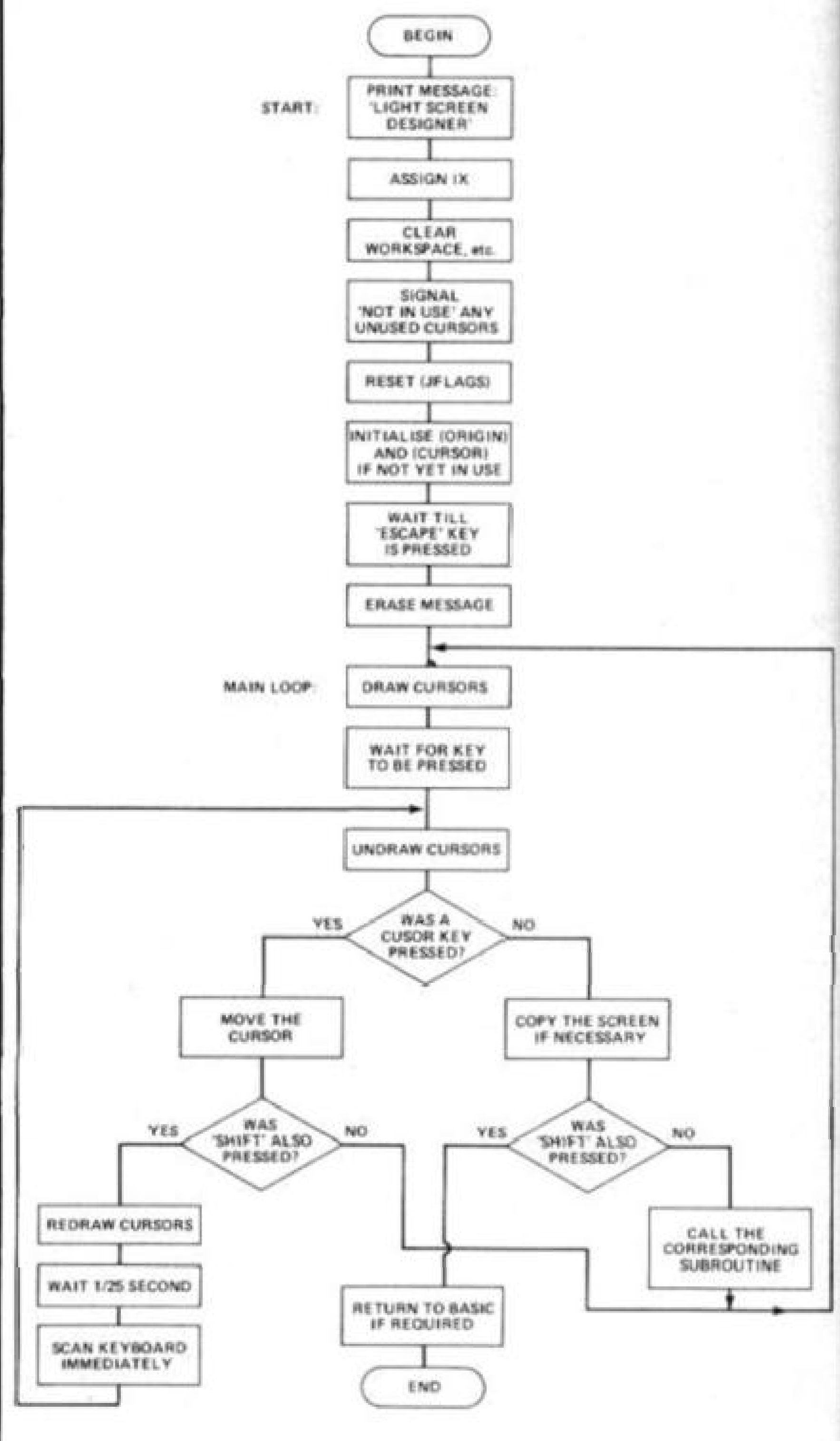


Figure 1. Flowchart describing initialisation procedures and main program loop.

Block Delete

Stan Rodgers sent this routine all the way from Switzerland, and it's worth Yodelling about!

I was going to put this in the "letters" section but then decided that although it's short it is a real masterpiece and deserves to be shown in all it's glory.

Stan was already working on this when we published Rodney Francis' version in the DEC/JAN issue, and he says that he thought that the version only did half the job, since the user still had to delete one line by hand. This routine deletes the block automatically and is shorter to boot!

A short machine code routine is set up in the printer buffer and this makes it suitable for both 16 and 48K machines, it functions as Stan explains:

> "It calls the monitor routine at 6510h to get the address of the first line to be deleted and then again to get the address of the line following the last line to be deleted. These addresses are then passed to the monitor routine at 6629h which performs the necessary deletion"

Simple eh? especially if you're a genius. I have tried this and it is incredible, it is much, much faster than several block deletes used in some professional Toolkit programs I've tried!

Stan also has a few words to say on the IN function which has been causing mayhem. As you may know on using this the value of BIT 7 is 1, except on issue 3 Spectrums when it is usually (but not always) 0. This means the value returned as natural varies between 255 and 191. Stan says "Strictly speaking only the 5 least significant bits are relevant when testing for a key in, so:

LET X=IN 65022: LET X=X-32 *INT (X/32)

and test for lower values which will be the same regardless of whichever machine is being used:

IF x=23 THEN . . .

He asks why we didn't think of it, all I can say is "Of course, it's obvious really, I thought everyone would have realised excuse, waffle, blush ....

Anyway, over to Stan who will explain how to operate his Block Delete.

Stan Say's...

The routine shown in fig. 1 provides a simple, compact, easy to use way of deleting blocks of source lines from a BASIC program. To use it, key in the program and SAVE it. Lines 4 to 6 comprise the loader and data necessary to create the machine code. Key in 'GOTO 4 ENTER' and the machine code is POKEd into memory locations 23300 onwards (this is in the PRINTER buffer). If the flashing message 'Checksum error' is displayed, you have probably made a mistake in the DATA statement at line 6. Check it carefully, correct the error and key in 'GOTO 4 ENTER' again. When correct, the message "DELETE loaded" comes.

Now you can test the routine. Key in 'GOTO 1 ENTER' and the routine requests the line number at which you want to start to deleting. Key in '4 ENTER' and the routine will ask for the line number up to which you want to delete. Key in '6 ENTER' and the routine will delete lines 4 to 6.

You can now save the BASIC and m-c with the commands

SAVE "delete"

and

SAVE "deletecode"CODE mem,20

Now you have a routine which occupies only lines 1 to 3 of a BASIC program. To use it, make sure there are no lines 1, 2 or 3 in the program you want to edit. Key in

MERGE "delete"

and the three lines of the BASIC routine are merged with your program. Now key in 'GOTO 3 ENTER' to load the machine code. The routine will ask you which lines are to be deleted as already described.

There is no restriction on the line numbers which you enter, except that they must satisfy the tests in line 1. If you give a non-existent line as the start line, deleting will commence with the next valid line. If the last line number you give does not exist, deletion will include the last line before this number. This is the most compact way of using the routine. However, if you don't mind using more than three lines, you can do the following. Delete line 3. Change line 5 to 'GOTO 1'. Now the routine will initialise itself when you MERGE it and key in 'GO TO 4 ENTER'.

Fig. 1 BASIC Block Delete routine and loader

```
   1 INPUT "Delete from line ";f
;" to line ";t: IF f<3 OR t>9999
 OR f>t THEN  GO TO 1
   2 POKE 23296,f-256*INT (f/256
): POKE 23297,INT (f/256): POKE
23298,t-256*INT (t/256): POKE 23
299,INT (t/256): RANDOMIZE USR m
em: STOP
   3 LET mem=23300: LOAD "delete
code"CODE mem,20: GO TO 1
   4 LET mem=23300: LET cs=0: RE
STORE 6: FOR i=0 TO 18: READ v:
POKE (mem+i),v: LET cs=cs+v: NEX
T i: READ csv: IF csv<>cs THEN
PRINT  FLASH 1;"Checksum error":
 STOP
   5 PRINT "Delete is loaded": S
TOP
   6 DATA 42,0,91,205,110,25,229
,42,2,91,35,205,110,25,209,205,2
29,25,201,2081
```

Fig. 2 Source-code/Machine-code disassembly for Block Delete

```
5B04   2A005B    LD HL,(5B00)
5B07   CD6E19    CALL 196E
5B0A   E5        PUSH HL
5B0B   2A025B    LD HL,(5B02)
5B0E   23        INC HL
5B0F   CD6E19    CALL 196E
5B12   D1        POP DE
5B13   CDE519    CALL 19E5
5B16   C9        RET
```

Here be dragons

Some pointers on how to produce that adventurous masterpiece from Glaswegian demon-destroyer, Brian J. Robb.

Adventure games are often most difficult to write. It is relatively easy to write a simple arcade type game: here you are only concerned with trying to get your 'space invader' to do what you want it to do. With an adventure program you are dealing with people. Your program must appear intelligent and be 'user friendly'. It has to be able to cope with all sorts of input from a frustrated adventurer.

There are several ways of writing an adventure program but they all begin the same. The programmer must have a good idea for an adventure and a plan. This is often the most difficult part of the whole process. The best place to get ideas is from a video range of source material. This mainly consists of Science Fiction and Fantasy books. The most widely used are those by Tolkein, but there is a wide range of books which can offer ideas.

There are other authors which are rarely touched such as Issac Asimov, H.P.Lovecraft and Tanith Lee. Many of the books from these and other authors can provide brilliant ideas for adventure scenarios.

Be seeing you...

Another, more widely used source, are television programmes and films. T.V. programmes such as The Prisoner and Doctor Who are good starting points to collect ideas. Many films, both in the cinema and on Video release, are good sources of inspiration. Films such as Krull, Dark Crystal and Science Fiction epics such as Return of the Jedi provide ideas for events and locations within your own adventures.

Magazine advertisments also provide ideas. The graphics displayed in an advert can spark off ideas for locations and characters within an adventure. The 'blurb' itself describing adventure games can provide ideas. If a game is for a computer other than your own, then based on descriptions in adverts and reviews in computer magazines, you can create a scenario for your own version of the game.

The majority of ideas come, not from only one source, but a mixture of all those mentioned. If you note down ideas for a while one day you may find you have several which fit together well to create an adventure scenario.

Mapping your Scenario

Once you have your scenario worked out then it's time to draw a map. Maps are an important part of adventure game writing because they provide an idea of where each location is, not just an abstract thought but a solid visual representation of your fantasy land.

When the map is finished you must 'stock' it with items, monsters and characters. On your map list the items to be found there and any monsters which may be lurking in the shadows. You should also list any special conditions to be met before a monster can be killed or and item collected. All this is shown in figure 1.

Only when all this has been done should the computer keyboard be approached. It is very tempting to begin programming as soon as you have an idea, without any planning, but all this will result in is a bug filled shambles of a program.

An adventure program can be put together as a series of interlocking 'modules' making it easier to trace bugs. A list of variables to be used throughout the program should be made and the variables should be initiated at the very beginning of the program. This makes up one module. The second module should contain the instructions for the game. The variables are shown in figure 2.

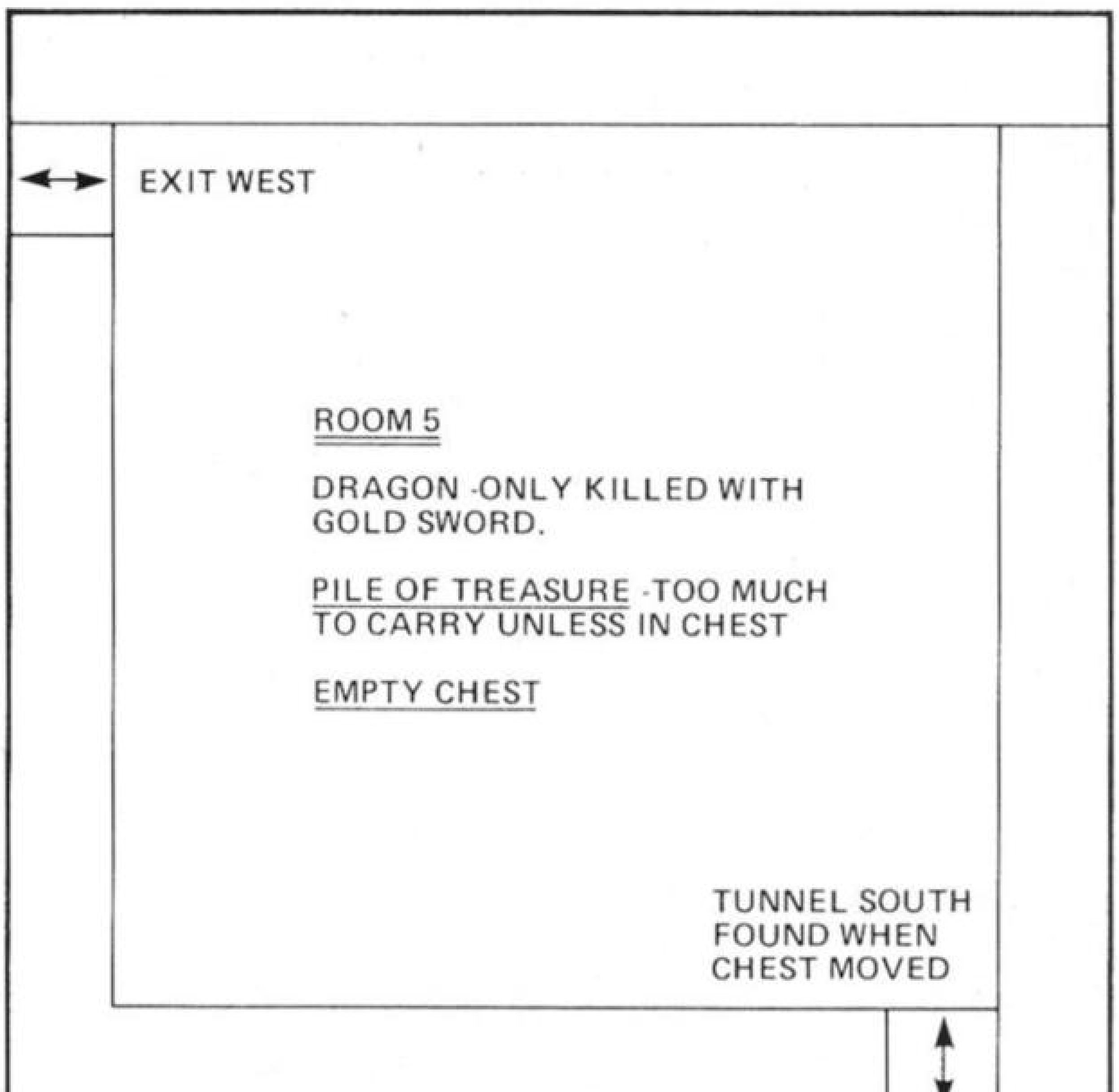


Figure 1. Mapping your adventure.

```
10 LET S=0 This is the characters strength
20 LET IQ=100 This is his wisdom/intelligence
30 LET M=0 This is his magic ability
40 LET TR=0 The value of treasure carried
50 LET A$="What Now?" A typical response
60 LET L=0 The location number
70 LET N=0 The number of items carried.
```

Figure 2. Setting up the variables.

```
300 REM MONTERS
310 IF M=1 THEN GOSUB 6000
315 IF M=2 THEN GOSUB 6010
Etc.,
6000 PRINT "YOU SEE A DRAGON"
6006 RETURN
6010 PRINT "YOU SEE A ZOMBIE"
6015 RETURN
Etc.,
```

Figure 3. Monster descriptions without READ and 'DATA.

```
600 REM TAKING
610 PRINT "WHAT DO YOU WISH TO TAKE?"
620 LET N=N+1
630 INPUT L$(N)
640 IF N =5 THEN PRINT "YOU ARE CARRYING TOO MUCH.DROP AN ITEM."
650 PRINT "YOU MAY CONTINUE"
660 GOTO 1000
```

Figure 4. A 'brain' routine to TAKE.

line 1000 is the location of the general input routine. This module is for the ZX-81 but is easily converted to other micros.

```
200 REM LOCATIONS
210 IF L=1 THEN GOSUB 5000 (Where L is the location Number.)
220 IF L=2 THEN GOSUB 5010
230 IF L=3 ETC.
5000 PRINT "YOU ARE IN A DEEP PIT, FILLED WITH SNAKES".
5005 RETURN
5010 PRINT "YOU ARE IN A FOREST WITH EXOTIC BIRDS".
5015 RETURN ETC.
```

Figure 5. Location descriptions without READ and DATA.



Main Module

Then follows the main module a control program or 'brain'. This module has to collect the location descriptions from the main body of the program. A large number of computers do this using READ, DATA loops, but the ZX-81, does not have this feature. Figure 3 shows a way to get round this problem.

The brain module contains all the routines likely to be used many times during a game. This would include routines such as GET;TAKE;DROP;FIGHT; RUN;REST;HELP;and USE. As your adventure grows so too can the program's vocabulary and 'brain'.

Once you have your variables set up, the many brain routines, and the location descriptions laid down you have to make your player-character mortal. A variable will have been set up to contain your characters strength or life points. During the program this should be decreasing until it reaches zero when the player-character is dead. The players strength or life points can be increased by eating food along the way or by using potions and magic.

Example Routine

Figure 4 shows a 'brain' routine for use with the ZX-81, but this is easily converted to other micros. Figure 5 shows a routine for finding locations without the need for READ and DATA statements. Figure 6 is a table showing the structure of the completed adventure.

When you have finished programming you should have an adequate adventure to baffle your friends for a while. If the task set or aim to be achieved is difficult enough your players should be occupied for quite a while. That is a sure sign that your program has succeeded.

STEPS TO WRITING

1. CREATE A SENARIO
↓
2. MAPPING
↓
3. PROGRAMMING

PROGRAM STRUCTURE

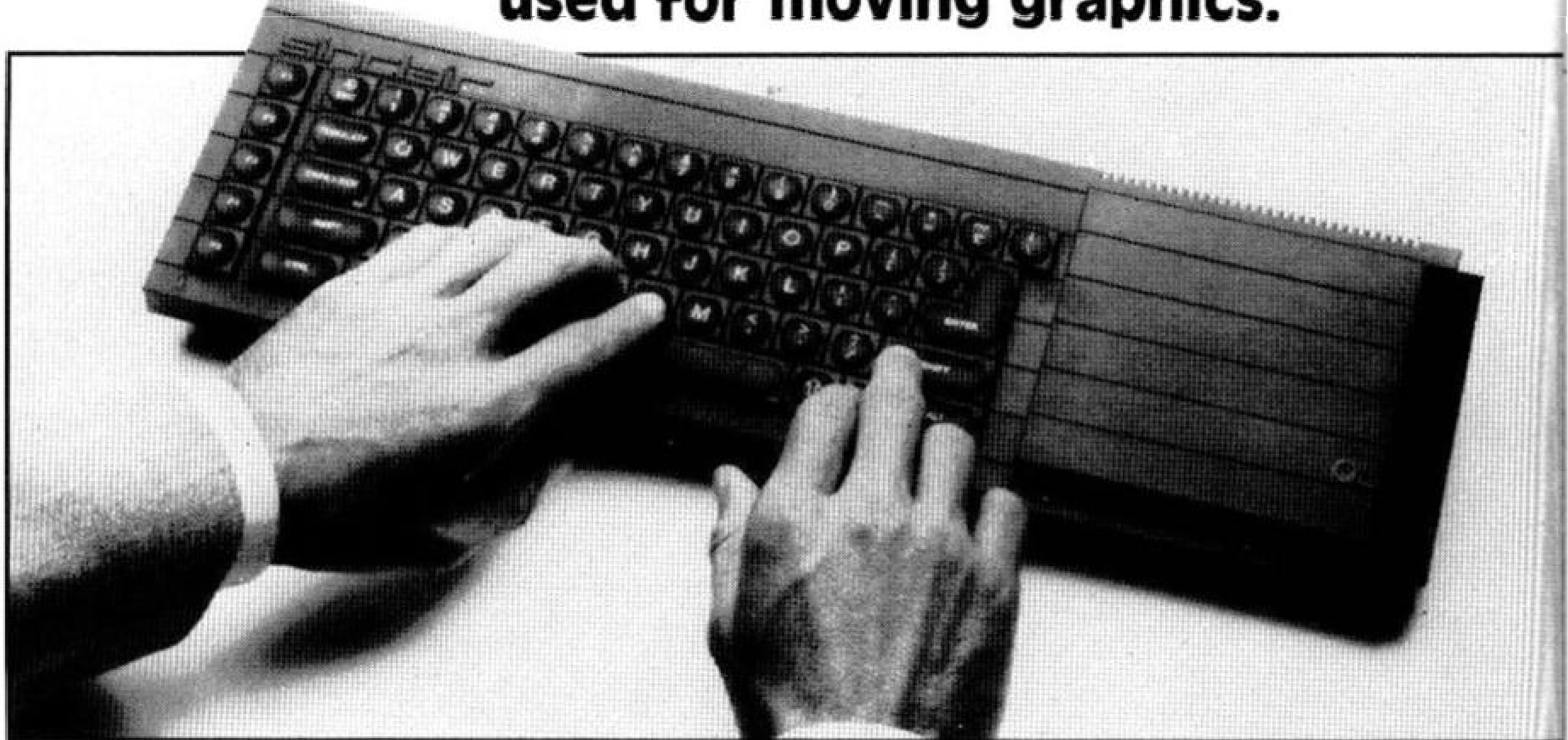
1. SET UP VARIABLES
↓
2. INSTRUCTIONS
↓
3. MAIN 'BRAIN'
↓
4. LOCATIONS ←
↓
5. MONSTER DESCRIPTIONS ←

Figure 6. The general structure of a program.


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Moving Graphics On The QL

Drive a racing car around the screen in this fast-moving game from Tim Hartnell, which demonstrates how effectively SuperBASIC can be used for moving graphics.



Drive a racing car around the screen in this fast-moving game from Tim Hartnell, which demonstrates how effectively SuperBASIC can be used for moving graphics.

Although the speed of the QL has been criticised, it is still possible to produce highly satisfactory moving graphics programs as you'll see when you run this program.

In QL RACER you drive a little racing car (which looks remarkably like an arrow) around a race track. You'll discover that the game, although it starts off running fairly slowly, is almost impossible to play. If you manage to get around the track once without crashing, it will speed up, and will continue to increase its speed for twenty games.

The program, which comes from my book *Tim Hartnell's QL Games Compendium* (Interface Publications, £5.95), makes the most of a number of features which are unique to the QL, such as the real-time clock.

You travel from the top left hand corner round the course clockwise, then up the left hand edge to your starting position, where you'll be given a new car. You must avoid all the edges to stay in the race. Your score is related to how long you manage to keep the car in action, an also to the 'difficulty leve which is set at the start of game.

As I pointed out, the real-tim clock is used in this program. Th QL's internal clock is used t give a readout which show how long you have survived The clock, and the score, is up dated using the procedure defin ed in lines 470 to 560.

```
10 REMark QL Racer
20  high_score=0
30  difficulty=21
40 REPeat cycle
50  initialise
60   REPeat race
70   increment_score
80    read_keyboard
90    erase_old_car
100    check_if_smash
110     IF smash=1 THEN EXIT race
120    place_new_car
130    BEEP 1000,RND(240 TO 250)
140   FOR delay=1 TO difficulty
150   END FOR delay
160   END REPeat race
170 REMark ------------------
180 REMark Smash sequence
190 FOR j=1 TO 70
200 AT car_down,car_across
210 INK RND(1 TO 7)
220 PRINT "*"
230 BEEP 10,RND(1 TO 20)
240 AT car_down,car_across
250 PRINT "+"
260 BEEP 10,RND(40 TO 70)
270 AT car_down,car_across
280 PRINT CHR$(254)
290 END FOR j
300 AT 0,0
```

```
310 STRIP 1:INK 7:PAPER 1
320 FLASH 1
330 PRINT "Your score is ";score
340 IF score>high_score THEN
350  high_score=score
360 END IF
370 AT 18,16
380 PAPER 2
390 PRINT "High score is ";high_score
400 FLASH 0
410 FOR y=1 TO 100
420    BEEP 50,y
430    BEEP 70,200-2*y
440 END FOR y
450 END REPeat cycle
460 REMark ----------------
470 DEFine PROCedure increment_score
480  score=score+1
490 AT 1,32
500 PRINT score
510 get$=DATE$
520 INK 7:PAPER 2
530 AT 9,5
540 PRINT get$(16 TO 20)
550 PAPER 0
560 END DEFine increment_score
570 REMark ----------------
580 DEFine PROCedure place_new_car
590 INK 6
600 AT car_down,car_across
610    PRINT car$
620 END DEFine place_new_car
630 REMark ---------------
640 DEFine PROCedure check_if_smash
650 smash=c(car_down,car_across)
660 END DEFine check_if_smash
670 REMark -------------
680 DEFine PROCedure erase_old_car
690 AT erase_down,erase_across
700 PRINT " "
710 END DEFine erase_old_car
720 REMark -------------
730 DEFine PROCedure read_keyboard
740 erase_across=car_across
750 erase_down=car_down
760 new$=INKEY$
770 IF new$="" THEN new$=old$
780 IF new$=CHR$(192) THEN
790  car_across=car_across-1
800  car$=CHR$(188)
810 END IF
820 IF new$=CHR$(200) THEN
830  car_across=car_across+1
840  car$=CHR$(189)
850 END IF
860 IF new$=CHR$(208) THEN
870  car_down=car_down-1
880  car$=CHR$(190)
890 END IF
900 IF new$=CHR$(216) THEN
910  car_down=car_down+1
920  car$=CHR$(191)
930 END IF
940 old$=new$
950 END DEFine read_keyboard
960 REMark -------------
970 DEFine PROCedure initialise
980 PAPER 0:INK 3:BORDER 4,2
990 CLS:CLS #0
1000  score=0
1010 IF difficulty>1 THEN difficulty=difficulty-1
1020 PAPER 7:INK 2
1030 AT 0,30:PRINT "Score:"
1040 AT 4,32:PRINT " ";difficulty;" "
1050 DIM a(233),b(233),c(20,30)
1060 REMark Build racetrack
1070 PAPER 6:INK 4
1080 CSIZE 2,0
1090 RESTORE
1100 FOR j=1 TO 233
1110  READ a(j),b(j)
1120  c(a(j),b(j))=1
1130 AT a(j),b(j)
1140 PRINT CHR$(254)
1150 END FOR j
1160 PAPER 1
1170 FOR j=1 TO 29
1180 READ x,y
1190 AT x,y
1200 INK RND(2 TO 7)
1210 PRINT CHR$(253):BEEP 100,5*j
1220 END FOR j
1230 REMark Place car
1240 car_across=3:car_down=3
1250 erase_across=car_across
1260 erase_down=car_down
1270 old$=CHR$(200)
1280 smash=0
1290 PAPER 0:INK 6
1300 FOR y=1 TO 50:BEEP 100,y
1310 SDATE 1984,7,3,0,0,0
1320 END DEFine initialise
1330 REMark -------------
1340 REMark Track data
1350 DATA 1,4,1,5,1,6.1,7,1,8,1,9,1,10,1,11
1360 DATA 1,20,1,21,1,22,1,23,1,24,1,25,1,26
1370 DATA 1,27,1,28,1,29
1380 DATA 2,2,2,3,2,4,2,11,2,12
1390 DATA 2,18,2,19,2,20,2,29,2,30
1400 DATA 3,1,3,2,3,12,3,16,3,17,3,18,3,30
1410 DATA 4,1,4,6,4,7,4,8,4,12,4,13
1420 DATA 4,16,4,23,4,24,4,25,4,26,4,30
1430 DATA 5,1,5,4,5,5,5,6,5,7,5,8,5,9
1440 DATA 5,13,5,14,5,15,5,16,5,21,5,22
1450 DATA 5,23,5,26,5,27,5,30
1460 DATA 6,1,6,4,6,9,6,19,6,20,6,21
1470 DATA 6,22,6,23,6,24,6,25,6,26,6,30
1480 DATA 7,1,7,4,7,9,7,10,7,19,7,20
1490 DATA 7,21,7,22,7,30
1500 DATA 8,1,8,4,8,10,8,11,8,12,8,13,8,14
1510 DATA 8,15,8,16,8,17,8,18,8,19
1520 DATA 8,20,8,28,8,29,8,30
1530 DATA 9,1,9,4,9,10,9,11,9,12,9,13
1540 DATA 9,14,9,15,9,16,9,17,9,18
1550 DATA 9,24,9,25,9,26,9,27,9,28,9,29
1560 DATA 10,1,10,4,10,11,10,18,10,19
1570 DATA 10,20,10,23,10,24
1580 DATA 11,1,11,4,11,5,11,6,11,7,11,8
1590 DATA 11,11,11,19,11,20,11,24,11,25
1600 DATA 11,26,11,27,11,28,11,29
1610 DATA 12,1,12,7,12,8,12,9,12,10,12,11
1620 DATA 12,14,12,15,12,19,12,20,12,21
1630 DATA 12,28,12,29
1640 DATA 13,1,13,10,13,11,13,14,13,15,13,16
1650 DATA 13,19,13,20,13,21,13,22
1660 DATA 13,29,13,30
1670 DATA 14,1,14,2,14,6,14,10,14,11
1680 DATA 14,15,14,16,14,19,14,20,14,22
1690 DATA 14,23,14,24,14,25,14,26,14,30
1700 DATA 15,2,15,4,15,5,15,6,15,7,15,10
1710 DATA 15,11,15,12,15,15,15,16
1720 DATA 15,20,15,21,15,22,15,23,15,24
1730 DATA 15,25,15,29,15,30
1740 DATA 16,2,16,3,16,4,16,7
1750 DATA 16,15,16,16,16,17,16,28,16,29
1760 DATA 17,7,17,8,17,14,17,15
1770 DATA 17,17,17,18,17,28
1780 DATA 18,8,18,9,18,10,18,11,18,12,18,13
1790 DATA 18,14,18,18,18,19,18,20
1800 DATA 18,21,18,22,18,23,18,24
1810 DATA 18,25,18,26,18,27,18,28
1820 DATA 14,21,7,7,9,5,6,5,9,8
1830 DATA 10,9,7,5,11,10,6,6
1840 DATA 9,6,5,25,6,8,9,7
1850 DATA 10,7,6,7,5,24,7,6
1860 DATA 7,8,11,9,8,5,10,10
1870 DATA 8,6,10,8,8,7,10,6
1880 DATA 8,8,8,9,10,5,9,9
```

Tower of Hanoi

Kenneth Baker of Southampton has written the ultimate version of this game in machine code for the 16K ZX81.

Invented about 100 years ago by the French mathematician Edouard Lucas, The Tower of Hanoi is perhaps the most fascinating and enduring of all puzzles. The object is to transfer the six parts of the Tower from position 'A' to position 'C' in the least possible moves, and without ever placing a larger block upon a smaller one. Position 'B' is used throughout as a temporary store.

To transfer a block from 'A' to 'B', simply input AB. If the move is valid the transfer will be made, and the score incremented by 1. The program is designed to reject any illegal moves.

In this six-tier version of the puzzle, the least possible moves is 63, and the maximum allowed is 99 — when the computer will decide that the player is doing so badly that it will automatically call a restart to the program. Restart can be called at any time by pressing 'R', and the only other active key, apart from the transfer keys ABC, is 'F', which will clear the program from memory.

To put the player on the right track, the first few moves are AB AC BC. . . but to say more might be to deprive the player of hours of hair-tearing frustration.

At the end of each game a caption containing a suitable comment as to the status of the final score will appear on the screen. Please remember that the least possible moves is 63.

The program is written entirely in Machine Code, which must be entered most carefully. The code is arranged in 139 lines of 11 HEX pairs: the first nine pairs representing the actual code, whilst the last two contain a checksum which is an addition of the code values in the line plus the line number. In this way, if any line should contain an error, or even if the wrong line is entered by mistake, it will be rejected with a request for the line to be re-entered.

Each line of 11 pairs should be entered together as a string, with one space between each pair. It should be noted, particularly if any other method of input is used, that the last two pairs are NOT instructions.

Making Space

The biggest problem with entering large Machine Code routines into the ZX81 is being able to create large enough REM statements in order to store them. The method chosen here is to form a REM statement of 120 characters in Line 4, and duplicating it 9 times in Lines 5-13 by the following method:

```
4 REM xxxxx(120
characters) xxxxx
EDIT
Change the Line No. to 5
Press N/L
EDIT
Change the Line No. to 6,
and so on, until Line 13 is
reached.
```

The size of Line 4 is then adjusted to encompass the 9 ensuing lines, which will result in a REM statement with the required number of 1254 bytes. When a REM statement is created in this way, it is most important to stabilize it with the addition of at least one line afterwards — hence the apparently redundant REM in Line 14 of the program, which must be left intact when the HEX LOADER is deleted.

Purely by the way, should you wish to use this technique in your own programs, the number of bytes per number of lines can be found by using the formula: ((C+6)/L)−6 where C= the total characters required, and

```
1 REM
2 SLOW
3 RAND USR 16731
4 REM THIS LINE CONTAINS THE MACHINE CODE READ TEXT BEFORE ENTERING THE PROGRAM
14 REM
15 POKE 16541,232
16 POKE 16542,4
17 LET Z=16544
18 LET V=28
19 FOR N=1 TO 139
20 LET T=N
21 LET C=1
22 DIM A$(33)
23 DIM A(9)
24 PRINT AT 18,0;"INPUT LINE NO. ";N
25 INPUT A$
26 FOR M=1 TO 25 STEP 3
27 GOSUB 50
28 LET A(C)=P
29 LET T=T+P
30 LET C=C+1
31 NEXT M
32 GOSUB 50
33 LET Q=P
34 LET M=M+3
35 GOSUB 50
36 LET P=256*Q+P
37 IF NOT P=T THEN GOTO 39
38 GOTO 43
39 PRINT AT 18,0;"ERROR IN LINE ";N;AT 19,0;"PLEASE RE-ENTER"
40 PAUSE 100
41 CLS
42 GOTO 20
43 FOR M=1 TO 9
44 POKE Z,A(M)
45 LET Z=Z+1
46 NEXT M
47 NEXT N
48 PRINT AT 18,0;"ALL CORRECT"
49 GOTO 54
50 LET I=CODE A$(M)-V
51 LET F=CODE A$(M+1)-V
52 LET P=16*I+F
53 RETURN
54 PAUSE 100
55 CLEAR
```



L= the number of lines. To avoid fractional answers, the odd byte or two can be added to the total characters. The best way to determine the number of lines is to factorize (C+6), again adding the odd byte until a convenient balance is reached. The length of the first line is then poked with (C+2).

When the code has bee[n] successfully entered, lines 15 t[o] 55 can be removed, and the fina[l] instruction, before saving an[d] running the program, is to POK[E] 16543, 127: this will make th[e] REM statement invisible, bu[t] can be omitted if my flair fo[r] cosmetic surgery is not to you[r] taste.

ZX-81 OWNERS

AT LAST THE PROGRAM YOU'VE BEEN WAITING FOR!

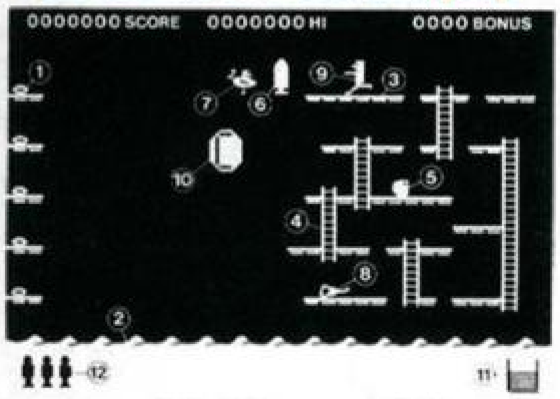


Rocket Man

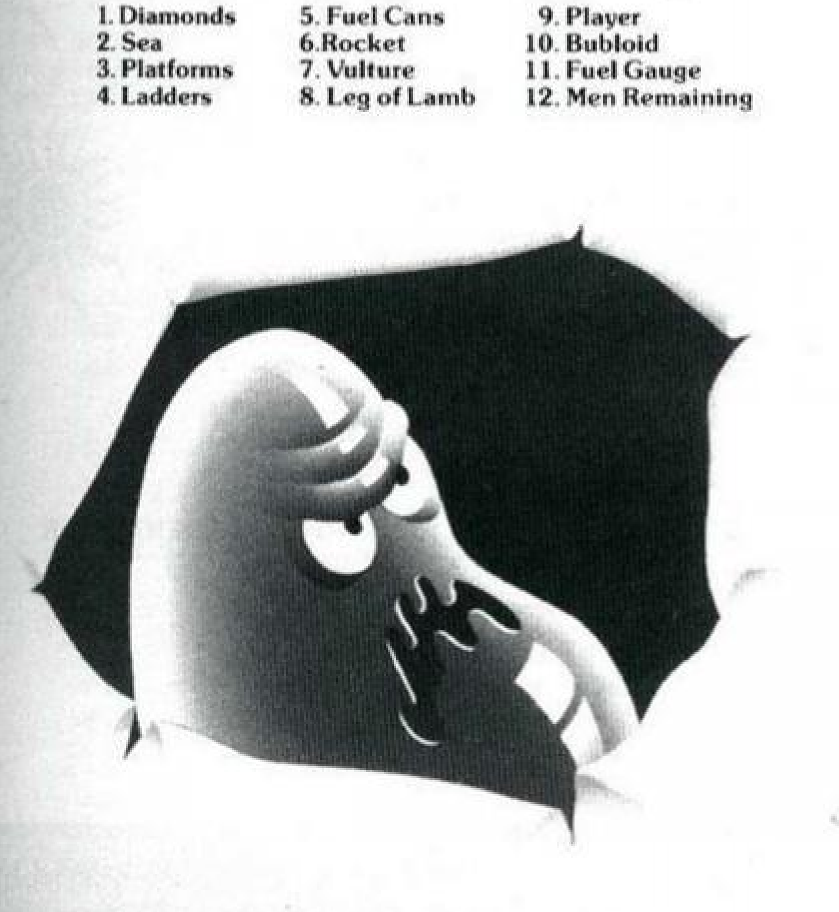
Coming Soon! SPECTRUM VERSION

with Hi-Res Graphics on standard ZX-81 16K

Actual ZX-81 Screen Display!



1. Diamonds	5. Fuel Cans	9. Player
2. Sea	6. Rocket	10. Bubloid
3. Platforms	7. Vulture	11. Fuel Gauge
4. Ladders	8. Leg of Lamb	12. Men Remaining



Get rich quick by collecting Diamonds that are simply lying there waiting for you!

Oh . . . I forgot to mention that there are one or two problems! There is an expanse of Shark infested water between you and the Diamonds and a strange breed of Bubble that seems hell bent on getting you in it! Somehow you must cross it. . . .

You have a Rocket Pac to help you (a Vulture on higher levels) but you must rush around the platforms and ladders collecting cans of fuel (legs of lamb with the Vulture) and cursing that weird Bubble. Once you have enough fuel then it's Chocks Away!

Oh . . . but don't run out of fuel on the way – otherwise it's . . . . SPLASH!

The aim is to collect all the diamonds from the far left hand side of the screen, whilst avoiding the rampant Bubloid. These emerge from the sea and are hell-bent on returning to their watery habitat with you in tow. Sooner or later you are going to end up in the drink – The idea is to make it later!

By belting round the system of platforms and ladders, cleverly avoiding the Bubloid, you collect the fuel cans which appear in random positions, until you consider that your fuel gauge indicates sufficient in the tank. Now you can go and collect your rocket. With the rocket-pack strapped to your back you can fly across the expanse of sea to collect the diamonds . . . but don't run out of fuel or your rocket-pack will simply disappear and you will wind up in the drink!

There are six stages with six different platform layouts. On stages 1-3 the Bubloid, which floats in front of the platforms with uncanny ease, gets an ever increasing ability to home in on your position, making the task of staying alive more demanding with each stage. On stages 4-6 you once again start with the easiest Bubloid (which is a blessed relief!) but the fuel cans are replaced by legs of lamb which you must collect to feed your vulture, and once it has enough energy (or you think it has!) you must flap across the water on its back to collect the diamonds.

Extra men are awarded for every 10,000 points – but ONLY once you have collected all the diamonds and so completed each particular stage.

GOOD LUCK!

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Pot Shot

Indulge in a little 'fowl-play' and avoid the gamekeeper with F A Slade's Pot Shot.

A simple but nonetheless entertaining game presented in two forms. Firstly a BASIC listing which plays perfectly adequately and then for comparative purposes try the Machine code version. The Basic program is entered as read.

To enter the machine code program enter listing 1, not forgetting the 356 dots in 1 REM, and RUN it.

Input each of the numbers in each line one at a time, the sixth number is a check and any errors will be trapped and you will be asked to re-enter an incorrect line.

Once all the numbers have been entered you may delete all the lines except 1 REM or leave them, the choice is yours. Enter the Machine code driver lines then SAVE your program. Although the code is checked on entry there is still a slight chance of error.

For further details I hand you over to Mr Slade:-

This game was originally written in machine-code for the younger members of the family. However, I have endeavoured to produce a reasonably accurate representation in BASIC. Any key may be pressed to fire the bullets.

The object is simply to score as many points with your limited ammunition, as possible. Set two or more six year-olds off on a competition and they will play for ages!

```
   10 CLS
   20 DIM A$(3,32)
   25 FOR I=1 TO 6
   26 LET A$(1,(I-1)*5+1 TO )=" "
+CHR$ 129+" "+CHR$ 4
   27 LET A$(2,I*5-2)=CHR$ 128
   28 NEXT I
   50 PRINT AT 1,0;A$(1, TO );A$(
2, TO );A$(3, TO );" ";A$(1, TO
31);" ";A$(2, TO 31);A$(3, TO );
"  ";A$(1, TO 30);"  ";A$(2, TO
30)
   60 LET A=PEEK 16396+(256*PEEK
16397)+775
   70 POKE A,128
   80 POKE (A-33),135
   90 POKE (A+1),5
  110 POKE 16514,0
  120 POKE 16515,0
  130 POKE 16516,0
  140 LET A=USR 16808
  150 LET A=PEEK 16515
  160 CLS
  170 PRINT AT 5,5;" YOUR SCORE =
";A;AT 6,5;"----------------";,
AT 15,5;"  ANOTHER GAME (Y/N) ?"
  180 LET B$=INKEY$
  190 IF B$="" THEN GOTO 180
  200 IF B$="Y" THEN GOTO 10
  210 STOP
```

Machine code driver

Program Description

Lines	
20-80	Set up the array A$ for the ducks.
90-110	The variables A for the control of the bullet position loop. B for the number of bullets fired. C for the score. D for the moving of the ducks. E for the position of the base.
120	POKEs the base into position. (Using D/FILE)
130	Prints the ducks each loop.
140	Adds 1 to D to move the ducks.
150	Checks D for restarting print position.
160-170	checks if bullet fired or key pressed.
180	Checks no bullets to end game. (May be changed).
190-240	Prints score and asks if another game required.
250	Start of bullet fired/print loop.
260	Adds bullets fired if loop just started.
270	Clears old bullet prints new bullet.
280	If bullet is not near ducks, jumps past hit routine.
290-300	Checks if hit head or body or nothing.
325-330	Increments bullet position or resets to 0
340-370	Hit duck.. clears A$ of duck (340-360)prints splat (362-368), increases score (370)
380	Resets A for hit (head or body)
385-390	Delay loop
395	Clears bullet for hit body.

```
    1 REM ..(356 characters)..
  300 FOR I=16514 TO 16873 STEP 6
  305 LET Y=0
  308 CLS
  310 FOR J=0 TO 5
  320 INPUT X
  322 PRINT X;" ";
  330 POKE I+J,X
  340 LET Y=Y+X
  350 NEXT J
  352 INPUT Z
  353 PRINT Z
  354 IF Y<>Z THEN PRINT "ERROR R
E-ENTER LINE."
  355 FOR K=1 TO 50
  357 NEXT K
  360 IF Y<>Z THEN GOTO 305
  370 NEXT I
```

Listing 1. Machine code loader

Machine Code

The machine code is held from 16514 to 16869 and requires a REM to hold the instructions. These numbers are POKEd into their correct addresses. The speed of the game is controlled by a delay loop from 16795 to 16807. 16797 and 16799 may be POKEd with different values to change the speed of the game. 16818 contains the number of bullets that can be fired and again this may be changed up to a maximum of 255.



The Basic Driver

Lines	
20-40	Set up A$ (for ducks)
50	Prints the ducks
60-90	POKEs the gun into position
110-130	Resets score etc. for mcn/cde routines
140	Calls mcn/cde routines.
150	PEEKs score.
160-200	Prints score and asks for another game.

The two graphics characters used in A$ (1,TO) are CHR$ 129 and CHR$ 4 and in A$ (2,TO) the graphics character is CHR$ 128.

Decimal machine code dump

Ø	7	1Ø	42	12	64	135
1	16	Ø	9	54	Ø	8Ø
1	18	Ø	9	3Ø	8	66
68	77	3	126	5Ø	13Ø	454
64	22	31	1Ø	119	35	281
3	21	32	249	Ø	58	363
13Ø	64	119	35	35	29	412
32	23Ø	42	12	64	1	381
48	Ø	9	22	8	68	155
77	3	126	254	27	4Ø	527
8	1	33	Ø	9	21	72
32	241	2Ø1	1Ø	254	129	867
4Ø	8	254	Ø	4Ø	37	379
54	Ø	24	235	54	Ø	367
229	35	54	Ø	35	35	388
54	Ø	1	32	Ø	9	96

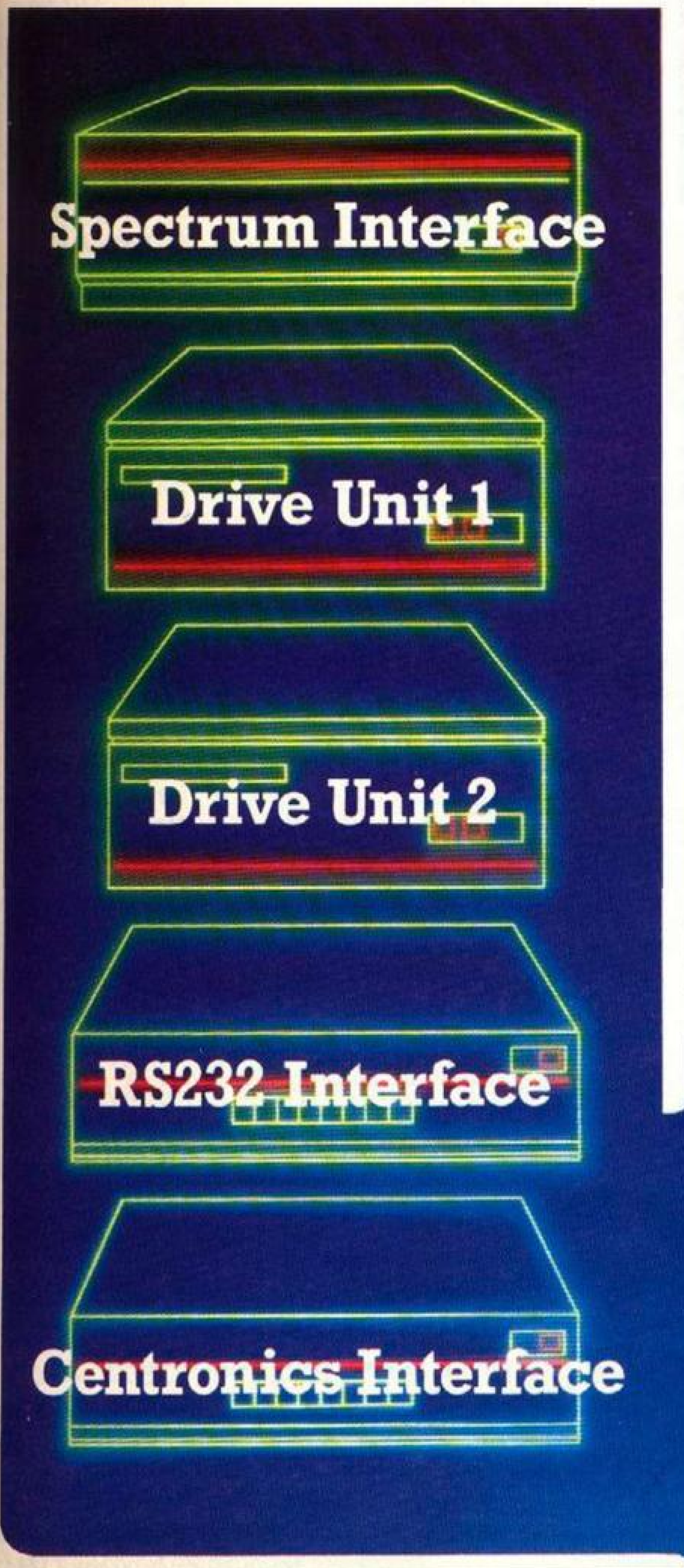
54	Ø	62	2	13Ø	95	343
58	131	64	131	5Ø	131	565
64	2Ø5	26	65	225	24	6Ø9
2Ø2	54	Ø	229	35	54	574
27	24	245	58	37	64	455
254	255	4Ø	21	42	12	624
64	1	164	2	9	126	366
254	27	4Ø	9	54	27	411
58	132	64	6Ø	5Ø	132	496
64	2Ø1	1	22Ø	255	9	75Ø
229	54	23	35	54	56	451
35	54	53	35	54	49	28Ø
35	54	38	35	54	57	273
35	54	23	2Ø5	155	65	537
2Ø5	155	65	62	7	225	719
54	Ø	35	61	32	25Ø	432
2Ø1	148	71	1	42	12	475
64	1	49	Ø	9	34	157
67	65	62	2Ø	5Ø	69	333
65	42	67	65	126	254	619
27	4Ø	22	58	69	65	281
61	4Ø	15	5Ø	69	65	3ØØ
42	67	65	1	33	Ø	2Ø8
9	34	67	65	24	227	426
2Ø1	54	Ø	1	223	255	734
9	126	254	Ø	32	4	425
54	27	24	219	254	129	7Ø7
32	25Ø	58	69	65	71	545
62	247	128	2Ø5	221	65	928
42	67	65	35	54	Ø	263
2Ø5	26	65	24	229	197	746
6	5Ø	14	5Ø	13	32	165
253	5	32	248	193	2Ø1	932
6	4	197	2Ø5	253	64	729
58	132	64	254	1Ø	4Ø	558
15	2Ø5	155	65	2Ø5	7Ø	715
65	193	5	32	235	2Ø5	735
133	64	24	228	193	14	656
5	197	6	4	197	2Ø5	614
7Ø	65	2Ø5	155	65	193	753
5	32	245	2Ø5	133	64	684
193	13	32	235	2Ø1	71	745
58	131	64	128	5Ø	131	562
64	2Ø1	28	28	28	28	377

BASIC listing

```
  2Ø DIM A$(8,32)
  25 FOR I=1 TO 6
  26 LET A$(1,(I-1)*5+1 TO )=" "
+CHR$ 129+" "+CHR$ 4
  27 LET A$(2,I*5-2)=CHR$ 128
  28 NEXT I
  5Ø LET A$(4, TO )=" "+A$(1,1 T
O 31)
  6Ø LET A$(5, TO )=" "+A$(2,1 T
O 31)
  7Ø LET A$(7, TO )="  "+A$(1,1
TO 3Ø)
  8Ø LET A$(8, TO )="  "+A$(2,1
TO 3Ø)
```

```
 9Ø LET A=Ø
 92 LET B=Ø
 94 LET C=Ø
 1ØØ LET D=2
 11Ø LET E=15
 12Ø POKE ((256*PEEK 16397)+PEEK
16396+742),151
 13Ø PRINT AT 1,Ø;A$(1,D TO );A$
(1, TO D-1);A$(2,D TO );A$(2, TO
 D-1);A$(3, TO );A$(4,D TO );A$(
4, TO D-1);A$(5,D TO );A$(5, TO
D-1);A$(6, TO );A$(7,D TO );A$(7
, TO D-1);A$(8,D TO );A$(8, TO D
-1)
 14Ø LET D=D+1
 15Ø IF D>=33 THEN LET D=2
 16Ø IF (INKEY$<>"") OR (A>Ø) TH
EN GOTO 25Ø
 17Ø IF INKEY$<>"" THEN GOTO 25Ø
 18Ø IF B<1Ø THEN GOTO 13Ø
 19Ø CLS
 2ØØ PRINT AT 2,5;"YOU SCORED ";
C;" POINTS";AT 7,5;"ANOTHER GAME
 (Y/N) ?"
 21Ø IF INKEY$="" THEN GOTO 21Ø
 23Ø IF INKEY$="Y" THEN GOTO 1Ø
 24Ø STOP
 25Ø FOR I=(2Ø-A) TO (17-A) STEP
 -1
 26Ø IF I=2Ø THEN LET B=B+1
 27Ø PRINT AT (I+1),E;" ";AT I,E
;"."
 28Ø IF I>8 THEN GOTO 32Ø
 29Ø IF PEEK ((PEEK 16399*256)+P
EEK 16398-51)=Ø THEN GOTO 32Ø
 3ØØ IF PEEK ((PEEK 16399*256)+P
EEK 16398-51)<>129 THEN GOTO 38Ø
 31Ø GOTO 34Ø
 32Ø NEXT I
 325 LET A=A+4
 33Ø IF A>16 THEN LET A=Ø
 335 GOTO 18Ø
 34Ø LET A$(I-1,E+D-1-((D>16)*32
))=" "
 35Ø LET A$(I-1,E+D+1-((D>15)*32
))=" "
 36Ø LET A$(I,E+D-((D>15)*32))="
"
 362 LET F=((PEEK 16399*256)+PEE
K 16398-21)
 363 LET C$="**SPLAT**"
 364 FOR J=F TO F+(LEN (C$)-1)
 367 POKE J,CODE (C$(J-F+1))
 368 NEXT J
 37Ø LET C=C+(12-I)
 38Ø LET A=Ø
 385 FOR J=1 TO 2Ø
 39Ø NEXT J
 395 PRINT AT I,E;" "
 4ØØ GOTO 18Ø
```

ALL-IN-ONE



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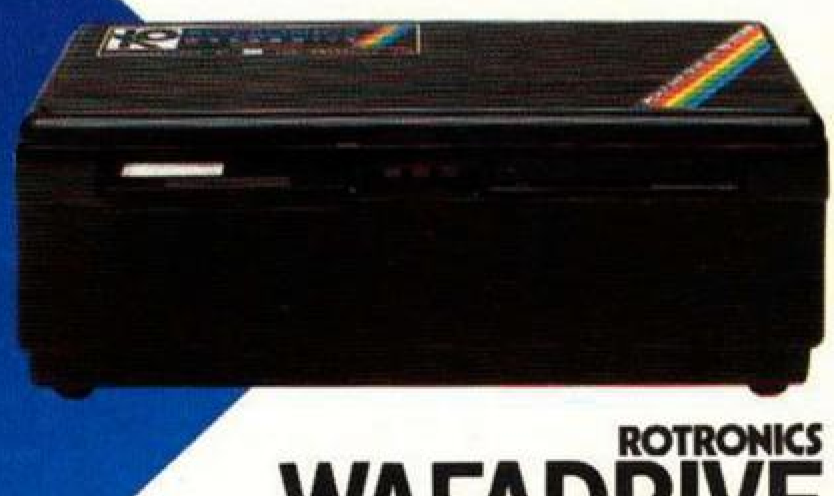
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ROTRONICS
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League Tables

Keep track of who's where with Gordon Jones who, just for the record, hails from Middlesex.



This is a versatile program for keeping track of teams in a league, it could be football, darts or drinking, in fact any activity which involves team positions.

The maximum number of teams as the program stands is twenty. This is all the ZX81 can display at once, but with a little programming effort and by viewing the league in sections this could be expanded.

The program is menu driven and prompts are provided at each stage, the program has provision for:

- Setting up a league table
- Entering results and calculating positions
- Displaying the processed table
- Viewing any teams previous result
- Copying either the table or list of results
- Saving the table and results on tape

This versatile program, a boon to any club secretaries, will run as it stands on a Spectrum.

For the adventurous programmer it could be used as a basis for a simulation game. We already have several football progs, so what about a pool league simulation game?

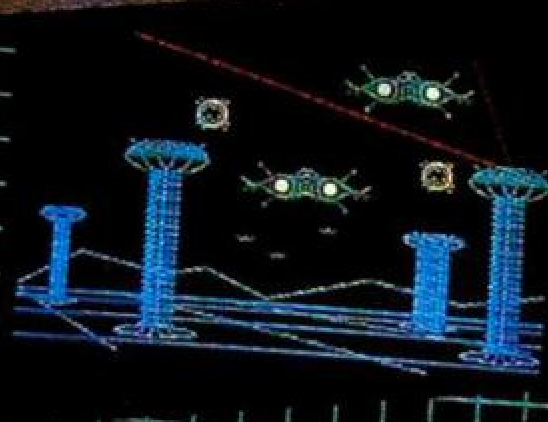
```
  10 REM "LEAGUE TABLE"
  20 LET NU=0
 100 CLS
 110 PRINT TAB 12;"MENU"
 120 PRINT AT 2,0;"1. SET UP NEW
 TABLE"
 130 PRINT AT 4,0;"2. PUT IN SCO
RES"
 140 PRINT AT 6,0;"3. VIEW TABLE
"
 150 PRINT AT 8,0;"4. VIEW PREVI
OUS RESULTS"
 160 PRINT AT 10,0;"5. SAVE ON T
APE"
 180 PRINT AT 16,0;"ENTER THE NU
MBER OF YOUR CHOICE."
 190 INPUT CH
 200 IF CH<1 OR CH>5 OR CH<>INT
CH THEN GOTO 180
 210 GOTO CH*1000
 300 STOP
1000 CLS
1040 PRINT "THIS ROUTINE WILL ER
ASE ALL","PREVIOUS ENTRIES."
1050 PRINT AT 16,0;"M=MENU C=CON
TINUE: M,C ?"
1060 INPUT M$
1070 IF M$="C" THEN GOTO 1110
1080 GOTO 100
1110 CLS
1120 PRINT "NAME OF LEAGUE ?","(
MAX 7 LETTERS)",,
1130 INPUT N$
1140 IF LEN N$>7 THEN LET N$=N$(
 TO 7)
1150 PRINT N$
1160 PRINT "HOW MANY TEAMS ?","(
MAX 20)        "
1170 INPUT NU
1180 IF NU<1 OR NU>20 OR NU<>INT
 NU THEN GOTO 1170
1190 LET RN=0
1200 DIM X$(NU,4)
1210 DIM P(NU)
1220 DIM W(NU)
1230 DIM D(NU)
1240 DIM L(NU)
1250 DIM K(NU)
1260 DIM T(NU)
1270 DIM F(NU)
1280 DIM A(NU)
1290 DIM R$(NU*(NU-1),8)
1300 DIM S(NU*(NU-1),2)
1310 CLS
1320 PRINT AT 16,5;"GIVE THE NAM
ES OF ";NU;" TEAMS."
1330 PRINT AT 18,5;"USE 4 LETTER
S FOR EACH TEAM"
1340 FOR J=1 TO NU
1350 PRINT AT 21,0;" ...."
1360 INPUT Y$
1370 IF LEN Y$=4 THEN LET X$(J)=
Y$
1380 IF LEN Y$<>4 THEN GOTO 1310
1390 PRINT AT J,0;X$(J)
1400 NEXT J
1630 CLS
1640 PRINT AT 5,0;"HOW MANY POIN
TS FOR A WIN ?  ";
1650 INPUT WP
1660 PRINT WP
```

```
1670 PRINT AT 10,0;"HOW MANY POI
NTS FOR A DRAW ? ";
1680 INPUT DP
1690 PRINT DP
1700 GOTO 3000
2000 CLS
2010 IF NU=0 THEN GOTO 8000
2020 FOR J=1 TO NU
2030 PRINT AT J,21;J;".";TAB 24;
X$(J)
2040 NEXT J
2110 FOR J=1 TO 21
2140 PRINT AT J,0;":
    :"
2150 NEXT J
2300 PRINT AT 0,0;"RESULTS READY
 ?"
2310 PRINT "Y=YES N=NO: Y,N ?"
2330 INPUT Y$
2350 IF Y$="N" THEN GOTO 2660
2360 IF Y$<>"Y" AND Y$<>"N" THEN
 GOTO 2330
2370 PRINT AT 0,0;"
   "
2380 PRINT "                    "
2390 PRINT AT 3,0;"HOME TEAM:LIN
E NO.?"
2430 SLOW
2440 INPUT HT
2450 IF HT<1 OR HT>NU OR HT<>INT
 HT THEN GOTO 2440
2460 PRINT AT 12,0;X$(HT);" "
2470 PRINT AT 5,12;"SCORE ?"
2480 INPUT HS
2490 IF HS<0 OR HS<>INT HS THEN
GOTO 2480
2500 PRINT AT 12,10;HS
2510 PRINT AT 7,0;"AWAY TEAM:LIN
E NO.?"
2520 INPUT AT
2530 IF AT=HT OR AT<1 OR AT>NU O
R AT<>INT AT THEN GOTO 2520
2540 PRINT AT 14,0;X$(AT);" "
2550 PRINT AT 9,12;"SCORE ?"
2560 INPUT AS
2570 IF AS<0 OR AS<>INT AS THEN
GOTO 2560
2580 PRINT AT 14,10;AS
2590 PRINT AT 21,0;"C=CONT E=ERA
SE: C,E ?"
2600 INPUT C$
2610 IF C$="E" THEN GOTO 2640
2620 IF C$<>"C" AND C$<>"E" THEN
 GOTO 2600
2630 GOSUB 9000
2650 GOTO 2110
2660 CLS
2670 PRINT AT 10,0;"RESULTS WILL
 NOW BE PROCESSED"
2680 PAUSE 50
2690 CLS
2700 GOSUB 7000
3000 CLS
3010 IF NU=0 THEN GOTO 8000
3070 FAST
3080 PRINT N$;AT 0,8;"P   W   D
  L   DIF PTS"
3090 FOR J=1 TO NU
3100 PRINT AT J,0;J;TAB 2;".";X$
(J);TAB 8;P(J);TAB 12;W(J);TAB 1
6;D(J);TAB 20;L(J);TAB 24;K(J);T
AB 28;T(J)
3110 NEXT J
3120 PRINT AT 21,0;"M=MENU C=COP
Y: M,C ?"
3130 SLOW
3140 INPUT M$
3150 IF M$="C" THEN COPY
3200 GOTO 100
4000 CLS
4010 IF NU=0 THEN GOTO 8000
4040 LET PF=0
4050 LET PA=0
4160 FOR J=1 TO NU
4170 PRINT AT J,20;X$(J)
4180 NEXT J
4190 PRINT AT 2,0;"PRINT THE NAM
E";AT 4,0;"OF THE TEAM";AT 6,0;"
YOU REQUIRE."
4200 INPUT T$
4210 CLS
4220 PRINT AT 10,5;"STARTING TO
SEARCH"
4230 PAUSE 20
4240 CLS
4250 FAST
4260 PRINT TAB 7;T$;TAB 13;"F:";
TAB 19;"A:"
4270 PRINT AT 1,0;"(HOME)";TAB 2
6;"(AWAY)"
4280 PRINT AT 1,7;"------------
---"
4290 LET LN=1
4300 FOR J=1 TO NU*(NU-1)
4310 IF T$=R$(J, TO 4) THEN GOSU
B 4580
4320 NEXT J
4330 LET LN=1
4340 FOR J=1 TO NU*(NU-1)
4350 IF T$=R$(J,5 TO 8) THEN GOS
UB 4790
4360 NEXT J
4370 PRINT AT 0,15;PF;AT 0,21;PA
4380 PRINT AT 21,0;"M=MENU C=COP
Y: M,C ?"
4390 SLOW
4400 INPUT M$
4410 IF M$="C" THEN COPY
```

```
4420 GOTO 100
4580 LET LN=LN+1
4590 LET DL=0
4600 LET GL=0
4610 GOSUB 4900
4620 PRINT AT LN,3-DL;S(J,1);TAB
 4;"-";TAB 6-GL;S(J,2);TAB 8;R$(
J,5 TO 8);TAB 15;":"
4630 IF S(J,1)>S(J,2) THEN PRINT
 AT LN,0;"W"
4640 IF S(J,1)<S(J,2) THEN PRINT
 AT LN,0;"L"
4650 IF S(J,1)=S(J,2) THEN PRINT
 AT LN,0;"D"
4660 LET PF=PF+S(J,1)
4670 LET PA=PA+S(J,2)
4680 RETURN
4790 LET LN=LN+1
4800 LET DL=0
4810 LET GL=0
4820 GOSUB 4900
4830 PRINT AT LN,18;R$(J, TO 4);
TAB 24-DL;S(J,1);TAB 25;"-";TAB
27-GL;S(J,2)
4840 IF S(J,1)<S(J,2) THEN PRINT
 AT LN,30;"W"
4850 IF S(J,1)>S(J,2) THEN PRINT
 AT LN,30;"L"
4860 IF S(J,1)=S(J,2) THEN PRINT
 AT LN,30;"D"
4870 LET PF=PF+S(J,2)
4880 LET PA=PA+S(J,1)
4890 RETURN
4900 IF S(J,1)>9 THEN LET DL=1
4910 IF S(J,2)>9 THEN LET GL=1
4920 RETURN
5000 CLS
5010 IF NU=0 THEN GOTO 8000
5020 PRINT "GIVE A NAME TO YOUR
TABLE."
5030 PRINT
5040 PRINT "USE IT TO RETRIEVE Y
OUR RESULTS."
5060 INPUT Z$
5080 PRINT AT 8,0;Z$
5100 PRINT AT 15,0;"START RECORD
ING. PRESS NEWLINE"
5150 INPUT I$
5160 SAVE Z$
5170 GOTO 100
7000 FAST
7010 FOR J=1 TO NU
7020 FOR M=1 TO NU-1
7100 IF T(M)>=T(M+1) THEN GOTO 7
500
7220 LET DX=T(M)
7230 LET T(M)=T(M+1)
7240 LET T(M+1)=DX
7250 LET D$=X$(M)
7260 LET X$(M)=X$(M+1)
7270 LET X$(M+1)=D$
7280 LET DX=W(M)
7290 LET W(M)=W(M+1)
7300 LET W(M+1)=DX
7310 LET DX=P(M)
7320 LET P(M)=P(M+1)
7330 LET P(M+1)=DX
7340 LET DX=D(M)
7350 LET D(M)=D(M+1)
7360 LET D(M+1)=DX
7370 LET DX=L(M)
7380 LET L(M)=L(M+1)
7390 LET L(M+1)=DX
7400 LET DX=K(M)
7410 LET K(M)=K(M+1)
7420 LET K(M+1)=DX
7500 IF T(M)>T(M+1) THEN GOTO 78
80
7510 IF K(M)<K(M+1) THEN GOTO 72
20
7880 NEXT M
7890 NEXT J
7899 SLOW
7900 PRINT AT 10,8;"NEARLY READY
"
7910 PAUSE 10
7950 RETURN
8000 PRINT AT 5,8;"NO TABLE YET"
8010 PRINT AT 10,8;"(M=MENU)"
8020 INPUT M$
8030 GOTO 100
9000 LET P(HT)=P(HT)+1
9010 LET P(AT)=P(AT)+1
9020 LET K(HT)=K(HT)+HS-AS
9030 LET K(AT)=K(AT)+AS-HS
9040 LET F(HT)=F(HT)+HS
9050 LET A(HT)=A(HT)+AS
9060 LET F(AT)=F(AT)+AS
9070 LET A(AT)=A(AT)+HS
9090 LET RN=RN+1
9100 LET R$(RN, TO 4)=X$(HT)
9110 LET R$(RN,5 TO 8)=X$(AT)
9120 LET S(RN,1)=HS
9130 LET S(RN,2)=AS
9240 IF HS>AS THEN GOTO 9310
9250 IF HS<AS THEN GOTO 9410
9260 IF HS=AS THEN GOTO 9510
9310 LET W(HT)=W(HT)+1
9320 LET L(AT)=L(AT)+1
9330 GOTO 9600
9410 LET W(AT)=W(AT)+1
9420 LET L(HT)=L(HT)+1
9430 GOTO 9600
9510 LET D(HT)=D(HT)+1
9520 LET D(AT)=D(AT)+1
9600 LET T(HT)=W(HT)*WP+D(HT)*DP
9610 LET T(AT)=W(AT)*WP+D(AT)*DP
9700 RETURN
```










WHITE LIGHTNING

16K SPECTRUM GAME

Astro Zone

Where would we be without our usual foray into space? Craig Sanders of Stockport provides the transport

Don't they ever learn? Despite the incredible losses due to Earth's accurate and deadly fire from an army of computer trained marksman, those suicidal Aliens continue to attempt to invade us.

But this time . . . who Knows? Maybe we are getting over confident, trigger fingers wearing a bit thin, stricken by conscience?

I liked this one because of the attention to detail, stars etc. and the fact that you have the extra advantage of five energy shields.

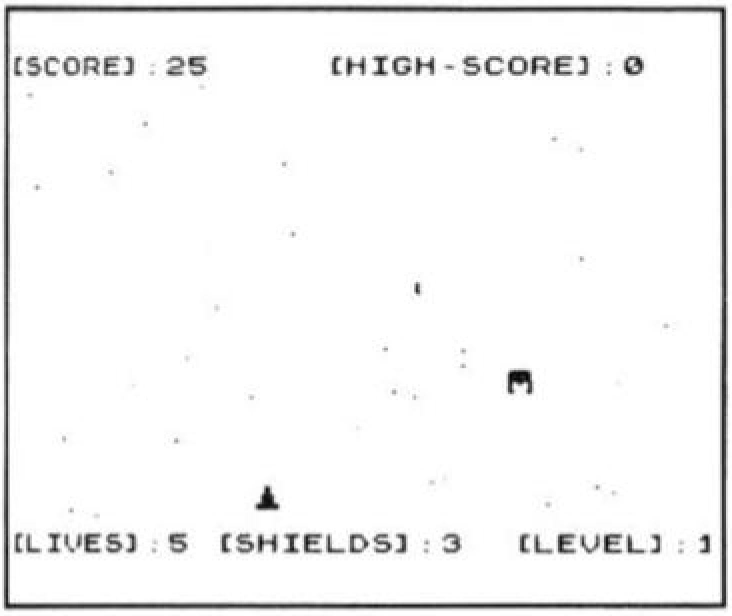
Craig has taken care to produce a game which is graphically effective with good use of sound and provides a challenge. I won't tell you my final rating, but there used to be an old cinema newsreel with a similar name.

All instructions and details of the control keys are included in the program.



```
   1 REM ******ASTRO ZONE******
   2 REM *  C.SANDERS 1983   *
   3 REM *      16K SPECTRUM      *
   4 REM *A,B,C and D in lines*
        *120,150,230,240,410,*
        *420 and 1030 are UDG*
        *graphic mode chars. *
        *********************
   5 LET hi=0
  10 REM ***GRAPHICS***
  15 PAPER 0: BORDER 0: INK 7: C
LS
  20 FOR f=0 TO 3: FOR g=0 TO 7:
 READ c: POKE USR CHR$ (144+f)+g
,c: NEXT g: NEXT f
  30 DATA 24,24,24,60,60,60,255,
255
  40 DATA 126,255,219,255,153,12
9,129,195
  50 DATA 32,1,72,16,8,0,68,16
  60 DATA 0,136,85,34,0,136,85,3
4
  70 LET sc=0: LET li=5: LET en=
3: LET z=19: LET m=12: LET le=1
 100 REM ***INSTRUCTIONS***
 110 FLASH 0: BRIGHT 0: OVER 0:
INVERSE 0
 120 PRINT AT 2,4; INK 4;"B   B";
 INK 7;" ASTRO BATTLE"; INK 4;"
B  B";AT 3,4; INK 7;"-----------
-----------"
 130 PRINT AT 6,4; INK 7;"CONTRO
LS:";AT 8,6; INK 6;"(5) - LEFT";
AT 10,6;"(8) - RIGHT";AT 12,6;"(
7) - FIRE";AT 14,6;"(6) - ENERGY
 SHIELDS"
 140 PRINT AT 18,4;"Press any ke
y to continue...": PAUSE 0
 150 CLS : PRINT AT 6,0; INK 7;"
OBJECT:";AT 8,0; INK 6;"Blast as
 many alien attackers   (B) as p
ossible,using your lasercannon (
A).You have 5 lifes and lose one
 every time an alien is able to
land.If you are unable  to reach
 the intruder use your  energy s
hields,but you will NOT score.Yo
u have a maximum of fiveenergy s
hields......GOOD LUCK!"
 160 PRINT AT 21,6;"Press any ke
y...":
 170 PAUSE 0: CLS : FOR i=30 TO
0 STEP -2: BEEP .01,i: BEEP .005
,i+30: NEXT i
 200 REM ***SCREEN DISPLAY***
 205 FOR f=0 TO 50: PLOT RND*250
,RND*170: NEXT f
 210 PRINT AT 0,0;"[SCORE]:";sc;
AT 0,15;"[HIGH-SCORE]:";hi;AT 21
,0;"[LIVES]:";li;AT 21,10;"[SHIE
LDS]:";en;AT 21,23;"[LEVEL]:";le
 211 IF le=1 THEN  LET x=2
 212 IF le=2 THEN  LET x=3
 213 IF le=3 THEN  LET x=4
 214 IF le=4 THEN  LET x=5
 215 IF le=5 THEN  LET x=6
 216 IF le=5 THEN  LET le=5
 225 LET s=INT (RND*24)+1
 230___ PRINT AT x,s; INK 4;" B ";A
T x-1,s;"   "
 240 PRINT AT z,m; INK 5;" A "
 250 LET m=m+(INKEY$="8" AND m<2
8)-(INKEY$="5" AND m>0)
 260 IF INKEY$="7" THEN  GO TO 350
```

```
 270 IF INKEY$="6" AND en>0 THEN
  GO TO 400
 280 LET s=s+(RND>.4 AND s<30)-(
RND>.4 AND s>1)
 290 IF x>=18 THEN  GO TO 600
 300 LET x=x+1
 310 BEEP 0.004,x
 315 IF sc=100 THEN  LET le=2
 316 IF sc=200 THEN  LET le=3
 317 IF sc=300 THEN  LET le=4
 318 IF sc=600 THEN  LET le=5
 340 GO TO 230
 350 REM ***FIRE***
 355 PLOT 8*(m+1)+3,24: DRAW 0,(
17.9-x)*8: OVER 1: PLOT 8*(m+1)+
3,24: DRAW 0,(17.9-x)*8: OVER 1
 360 FOR p=10 TO 15: BEEP .005,p
: NEXT p: OVER 0:
 370 IF m=s THEN  GO TO 700
 380 GO TO 260
 400 REM ***ENERGY SHIELDS***
```




```
 410 FOR n=18 TO 2 STEP -2: PRIN
T AT n,0; INK 6; PAPER 9;;"DDDDD
DDDDDDDDDDDDDDDDDDDDDDDDDDD": NE
XT n
 420 PRINT AT x,s+1; INK 6; PAPE
R 2;;"C": FOR v=40 TO 55: BEEP .
02,v: NEXT v: PRINT AT x,s+1;" "
 430 FOR n=2 TO 18 STEP 1: PRINT
 AT n,0;"
          ": NEXT n: PAUSE 10
 440 LET en=en-1
 460 GO TO 210
 600 REM ***LIVES***
 610 LET li=li-1: IF li=0 THEN
GO TO 650
 615 PRINT AT x,s;"   "
 620 FOR f=1 TO 2: BEEP .05,20:
BEEP .05,0: BEEP'.04,2: BEEP .05
,1: NEXT f
 630 GO TO 210
 650 GO TO 1000
 700 REM ***EXPLOSION***
 710 PRINT AT x,s+1; INK 6; PAPE
R 2;"C": FOR v=40 TO 55: BEEP .0
3,v: NEXT v: PRINT AT x,s;"   ":
 715 LET sc=sc+25
 720 GO TO 210
1000 REM ***GAME OVER***
1005 FOR g=1 TO 5: FOR f=0 TO 7:
 BORDER f: BEEP .03,f: NEXT f: N
EXT g
1010 BORDER 0: PAPER 0: CLS : PR
INT AT 10,10;"GAME OVER"
1020 PAUSE 30
1030 PRINT AT 10,10; INK 6; PAPE
R 2;"CCCCCCCCC": FOR a=10 TO 20:
 BEEP .02,4-a: NEXT a: PRINT AT
10,10;"          ": PAUSE 50: CLS

1040 PRINT AT 5,0;"FINAL SCORE="
;sc
1050 IF sc>hi THEN  LET hi=sc
1060 PRINT AT 7,0;"HIGH-SCORE=";
hi
1065 PRINT AT 9,0;"LEVEL=";le
1070 IF sc<=0 THEN  PRINT AT 15,
0;"P A T H E T I C!!!"
1075 IF sc>0 AND sc<300 THEN  PR
INT AT 15,0;"NOT BAD - TRY AGAIN
!"
1080 IF sc>300 AND sc<700 THEN
PRINT AT 15,0;"GETTING BETTER"
1090 IF sc>700 AND sc<800 THEN
PRINT AT 15,0;"EXCELLENT!"
1095 IF sc>800 AND sc<900 THEN
PRINT AT 15,0;"SUPREME CHAMPION!
!!!":
1100 IF sc>1000 THEN  PRINT AT 1
5,0; PAPER 6; INK 2; FLASH 1;"UL
IMATE SUPREME CHAMPION!!!!!!"
1200 PRINT AT 20,0;"Press any ke
y to play again...."
1250 FOR c=1 TO 5: FOR x=0 TO 7:
 BEEP .01,x+c: BEEP .02,x+c: BEE
P .03,x-c: NEXT x: NEXT c
1300 PAUSE 0: CLS : GO TO 70
```





THE MOST IMAGINATIVE GRAPHICS PROGRAMMING SOFTWARE FOR YOUR SPECTRUM



GRAPHICS PROGRAMMING MADE EASY– THE PRINT 'N' PLOTTER WAY!



PRINT 'N' PLOTTER

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Superb Graphics – without expensive hardware!

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Just take a look at some of the facilities available:

UDG EDITOR

The facility to define up to 84 graphics characters which can be stored in your BASIC programs for instant recall from its own built-in machine code!

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UDG planner for the 4 banks of characters. Facilities include: MIRROR IMAGE, ROTATE, INVERSE, FILE.

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Experimentation 'window' that allows you to try-out your UDG ideas under development.

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Amazing versatile high-resolution drawing board which includes PAPER choice, PLOT, DRAW, DRAW RADIALLY, CIRCLE, ARC, OVER, FILL, instant change of INK and BRIGHT, multi-function ERASE and STORE.

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SCREEN PLANNER

For the best of both worlds! PRECISION PLOTTER and UDG CHARACTERS! For complete screen planning of graphics. A multi-purpose facility to enable you to produce superb screen graphics!

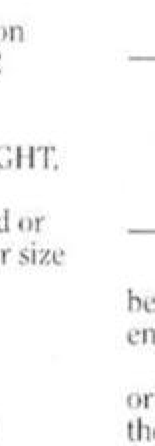
All results can be sent to a printer, saved as SCREEN$ or SAVED as CODE with its built-in machine code routine for instant recall from BASIC.

The program is complete with a cassette demo and a 28 page booklet describing in easy-to-understand language how to use it, plus many tips for storing and using your graphics in programs.

PRINT 'N' PLOTTER

SCREEN MACHINE

Instant machine code for graphics and text.



SCREEN MACHINE is an invaluable graphics utility to use with PAINTBOX or any other graphics hardware or software!

It gives a wide range of facilities to enable you to manipulate graphics and text, saving time, memory and giving truly professional results.

For instance: SCREEN MACHINE COMPRESSES Screen Files to cram even more into the memory!

It COMPILES text, graphics characters or UDG's instantly into machine code giving fast smooth access to the screen!

It CREATES re-callable Multiple Screen Files automatically with its own built-in machine code!

It ENLARGES screen sections in 2X steps!

It REDUCES the whole screen in 2X steps!

It RECOLOURS your screen graphics either globally or selectively!

It MIRRORS the screen left to right making flip-action animation easy!

It RELOCATES your screen graphics to any other part of the screen with block or high-resolution scrolls!

It SUPERIMPOSES screen graphics giving incredible 'mixing' results!

It SAVES everything to tape or Microdrive for use within your BASIC programs!

There's no doubt that SCREEN MACHINE is a major graphics toolkit for the 48K Spectrum. It is completely menu-driven and comes complete with demo program and fully-documented instruction booklet.

Another first from Print 'n' Plotter!

PRINT 'N' PLOTTER

ZX SPECTRUM JOTTER

Pre-planning your screen made easy . . . and precise!

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It's also 100 pages thick. 50 pages of PLOT grids showing each numbered pixel co-ordinate and 50 pages of PRINT grids showing every character and graphic character position and INPUT lines.

Each page also contains 24 UDG planning grids (2400 per pad).

Consider also the fact that it is printed on Artist's Detail paper . . . thick enough to take any writing, drawing or colouring, yet thin enough to overlay onto a drawing and trace-off.

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The complete package comes with a set of coloured pens, a Pixel ruler and a handy corrugated storage tray.

If you use PAINTBOX, SCREEN MACHINE or any other graphics utility . . . you'll do things better with the ORIGINAL Print 'n' Plotter JOTTER!

PRINT 'N' PLOTTER

KEYBOARD OVERLAYS

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Print 'n' Plotter KEYBOARD OVERLAYS for the standard ZX Spectrum keyboard are the economic answer to "Which key does what?"

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This can be as simple as the "FIRE" button in a game or as precise as the "analysis" button in a scientific program.

Let's face it, the Spectrum keyboard is complicated enough so why not take the easy way to remember . . .

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Then keep the OVERLAY for the next time you use the program.

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Print'n'Plotter Products

INTERFACITS — Joystick Interfacing Investigated!

A comprehensive round up of the unit[s] available — checked out by our team of reviewers

One of the first add-ons that a computer owner may contemplate buying is a joystick of some kind. The increase in control that this provides is of obvious benefit to the dedicated games player. In addition it is becoming increasingly necessary for some of the complex graphics packages that are appearing for the Spectrum. However if you have not yet taken the plunge and are now contemplating the purchase of some form of controller you have a difficult choice ahead of you. In essence, most of the actual joysticks are very similar, and your eventual purchase will be based upon personal preferences for shape, size, ease of use etc., but the biggest decision to make will be that concerning the vital link between your joystick and the computer i.e. the INTERFACE.

Interfaces allow the use of joysticks with compatible software, and although there is a great variety of material available for use with all the more common interfaces no single one will give you control over every game, unless, of course you opt for a PROGRAMMABLE INTERFACE. These claim to give you joystick compatibility with ALL software.

Non programmable

Kempston
£11.95

Probably the nearest thing to a "standardised" interface. This unit has been around almost as long as the Spectrum itself and most games have a Kempston option.

The unit works by utilising the IN31 function and so the keyboard is not enabled. This also means that a program must cater specifically for it and some of the earlier games don't. To get over this Kempston market a set of tapes which will convert some of these to operate with their interface. each of these will cost £4.95.

The box plugs into the port of the back of the Spectrum and the joystick plugs into a standard 9 pin socket at the front of the unit. This means that the joystick leads trail over the keyboard and if you have a full sized keyboard then this plus the fact that the box has a "lip" means that fitting it is a great problem.

Although it's starting to show it's age there's still plenty of life in this well tried and loved device.

Interface II
Sinclair Research
£19.95

A multi purpose unit which includes two joystick sockets, a ROM cartridge socket and a limited through port.

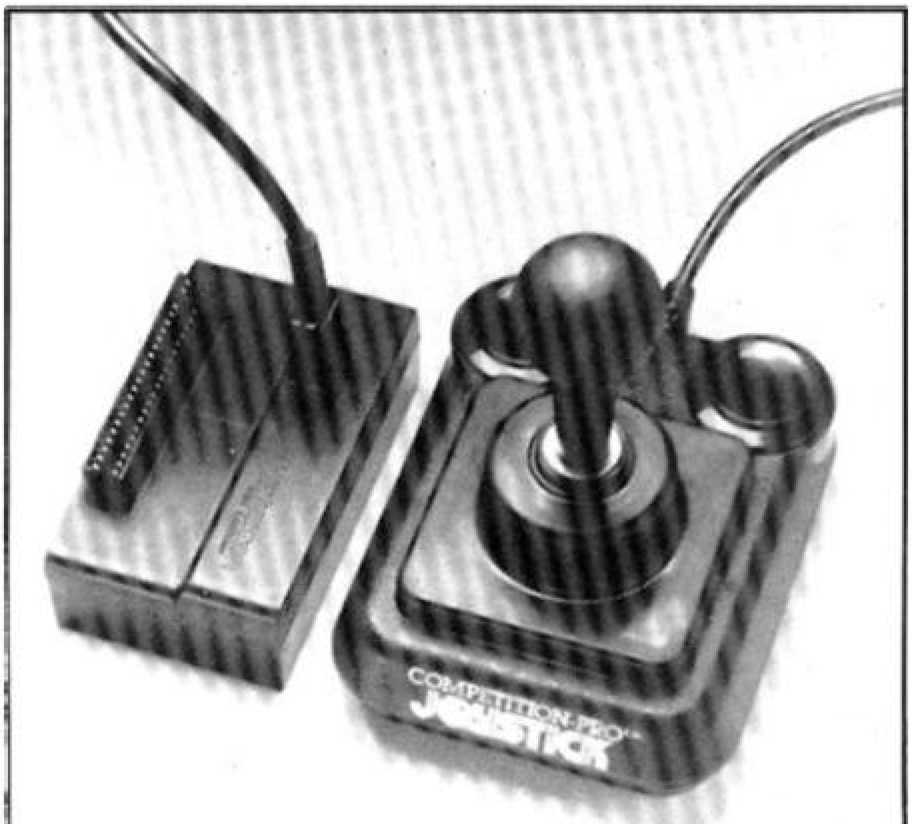
Sir Clive in his wisdom, decided to use his own "standard" for operating his interface and this is not the same as Kempston. This means that many of the earlier games will not operate with it although most of the recent programs incorporate an interface II option. In fact many games have a larger choice of joystick options than gameplay options!

When provided, two joysticks can be used simultaneously and this is the greatest advantage of this unit. It has been on the market for quite a while now and the presumed flood of cartridge programs has not materialised. This is really the power of this unit and if they are not going to be produced then it has limited value as a joystick interface.

RAM Turbo
Ram Electronics (Fleet) Ltd.
£22.95

Similar to the Sinclair Interface II, this unit has two joystic[k] sockets and a cartridge slot. [It] also has a through port but in th[e] Turbo it is a full one unlike th[e] Interface II.

The Sinclair format is not u[s]ed, but both Kempston (IN31) and Protek (cursor keys) systems are supported. I don['t] know if this means that only on[e] joystick at a time can be used a[s] we never received a review uni[t].



Games Ace
Vox Box
Datel Electronics
£29.95

Although requested, neither o[f] *these units were sent fo[r]* review, so I'll just give a mentio[n] of the information available.

Games Ace works on th[e] Kempston function so it will b[e] compatible with that option, [it] also has the bonus of includin[g] circuitry to output the sound t[o] the TV where the volume can b[e] controlled.

Vox Box is the same as th[e] Games Ace but also includes [a] speech synthesizer based on th[e] allophone system. Sounds interesting.

Pro Joystick Interface
Kempston Micro Electronics Ltd.
£19.95

After a long run with their bes[t] selling interface Kempston hav[e] decided to introduce this mode[l]. Similar in many respects to th[e] Sinclair Interface II it seem[s]



much more versatile. As it's hot off the production line we haven't yet seen one. However, I'm told that it has three separate 9-pin plugs which cover Kempston's own system, Sinclair I/F II standard and the AGF/Protek cursor key format. There is also a ROM cartridge port. With Kempston's experience in the market it's got to be worth a look.

Solidisk Technology Ltd.
£8.50

One of the cheapest interfaces on the market, this one operates on the Kempston standard and is claimed to be wobble free. Sold complete with a Quickshot-style joystick for £15.50.

Even more useful is that should you forget to change the switch or get the wrong option then you can safely change the option once the program has been loaded and is actually running!!

An interface which I would recommend to any dedicated games player who requires a simple, effective means of joystick control.

Protek also market a presentation pack of joystick, interface and their own flight simulation program for £24.95.

AGF Joystick Interface II
£9.95

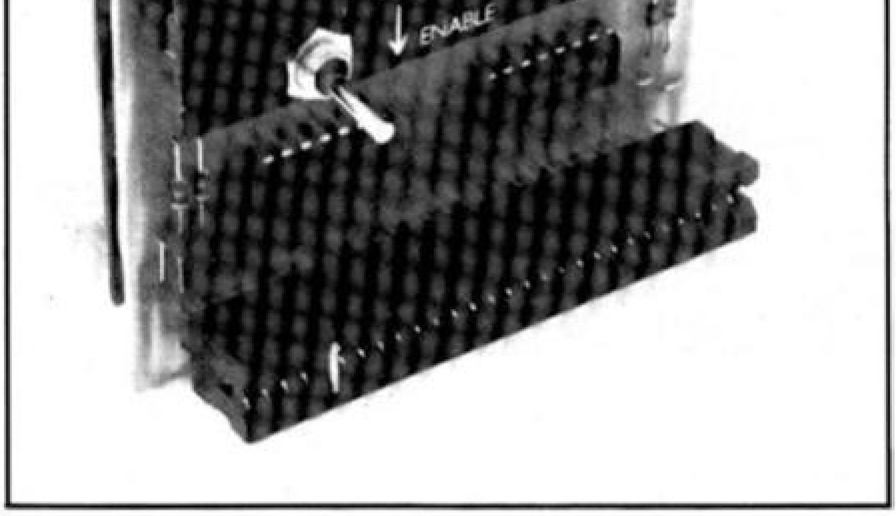
AGF have two joystick interfaces on the market at the moment — one programmable and the other not. Interface II is the non-programmable one, but there are versions for both the ZX81 and the Spectrum.

The interface will accept a wide range of joysticks including Atari, Starfighter, Le Stick etc. and has facility for a second joystick to be used. There isn't much to it in the way of hardware, just a few plugs and sockets and six chips. I noticed they have rubbed off the numbers on the chips to deter people making their own, but at £9.95 it's not worth the bother.

The interface just clips on the back of your computer and has a rear extension for more add-ons. With a joystick plugged straight in it will mimic keys 5,6,7,8 and 0 and the second port will give you T,Y,U,I and P.

To convert games that do not use these keys, you will have to purchase AGF's software and you have a choice of two cassettes. Tape one will convert Arcadia, Schizoids, Hungry Horace, Horace goes Skiing, Spectres, Penetrator and tape two converts Centipede, Planetoids, Jet Pac, PSSST, 3D Combat Zone and Invaders.

After you have loaded the cassette it will ask you which game you would like to play and after running the tape further it will automatically find the corresponding software to convert that game and tells you when to load your game.



On the inlay, it lists the games you can use the interface with. I would have thought it would have been better to list the key operations as well so that it would be easy to find what other games you could play with it.

You can buy the interface, software and joystick direct from AGF if you cannot find it at your local store. Cassettes are £4.95.

It is a slightly 'Heath Robinson' way of connecting a joystick but it is cheap.

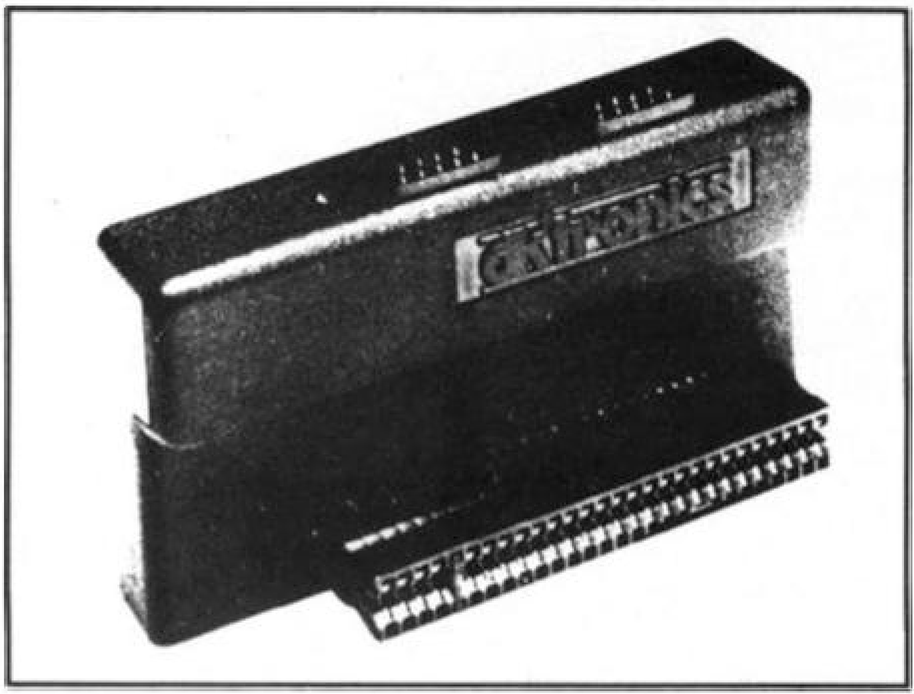
Clive Smith

DK'Tronics Joystick Interface
DK'Tronics Ltd.
£13.00

Another little shiny black box (7 × 5 × 2 · 5cm.) to get quickly forgotten somewhere between joystick and computer is the **DK'Tronics Joystick Interface**.

It has a firm positive fit into the expansion port at the rear of the Spectrum, although because only 22 of the contacts on the edge connector are used, the actual fitting tends to require more care and caution than with other units. There are two nine pin, 'D' type ports at the top of the unit and both are clearly identificable. The first is for use with software using a key change option or using 6,7,8,9 or 0 keys. The second port uses the IN31 command is therefore for use (software compatible) with the Kempston type joystick.

The test routines and a few example programs (one using ▶



machine code) are given in the accompanying instruction leaflet, for those people who want to stretch themselves beyond being mere players, who want to incorporate their joystick and interface into their own programs. And for those programmers who want to use **two** joysticks to control two separate objects at the same time on the screen, then both ports of this interface can be incorporated simultaneously into programs.

Just out of interest, I wonder how many micro-users actually do use their joysticks and interfaces for anything else besides playing commercially produced games?
Colin Christmas

Programmable Interfaces

Rainbow Electronics £24.00 (+ £3.00 extra for a through-port)

Another interface which never made it to our office in time for this roundup.

The interface includes a built in amp and speaker, the joystick socket and the programming switch are positioned at the front (with all the associated problems).

CCI (Custom Cables International) £15.00

This unit is programmed by means of software supplied on tape, and this means that you have to load in the program supplied before loading your game. This isn't a great problem as it is a short program and setting up the keys is straightforward and only takes a few minutes. The unit we had didn't have any instructions. CCI promise that they are supplied with each purchase — we just had "a very early preview model". Nevertheless I found it simplicity itself to operate even without them — which can't be bad.

The only problem is that some games don't tell you which keys the program uses so you have to load them in first to find out! This is only a problem the first time round because, being sensible, you kept a record for the next time, didn't you?

The unit proved reliable and effective over a three week period of constant and frequent use and I see no reason why it shouldn't perform admirably for a long, long time.

At the price it is probably one of the cheapest of it's kind and worth considering if, as it is for me, money is a prime factor.
Jim Watson

Programmable Joystick Interface Stonechip Electronics £24.45

As with most similar interfaces this is simply a plug-in unit which requires no additional links such as flywires of extra tapes to load. The unit itself measures 90 × 75 × 35mm and is contoured to fit snugly to the rear of your Spectrum. It features a three-way switch at the front enabling the user to select any of the three modes; Program, Play or Normal operation (where control relies upon the keyboard alone).

The interface draws its power from the computer and a small red L.E.D. indicates power on. A standard 9 pin Atari-style joystick socket allows the use of your favourite zap-em-stick!

It is at this stage that my first complaint appears. No doubt many satisfied users will disagree, but why, when an increasing number of games require the use of at least two extra hands, does the port have to be placed so that the joystick lead runs right across the keyboard?

Programming of the interface is fairly easy — set the selector to the Program position, press the appropriate direction key and move the joystick into the relevant (or not so relevant) position. The small, but adequate, instruction sheet advises that the most complex functions be dealt with first and this gives rise to the second little quibble.

As opposed to certain other interfaces available, the Stonechip requires the FIRE function to be input separately for each and every direction. This is sometimes not all that easy when you require one hand for the keyboard, one for the fire button and direction and one to stop the mobile joystick from sliding off the table!

Apart from that, the programming of this interface is a straightforward, it not lengthy, process. Programming complete, just move the selector to Play and away you go! One additional feature is the Normal position that allows the joystick to be removed without loss or corruption of the keys already programmed.

The unit was tested with a variety of joysticks and performed perfectly well with all of them. Included in the instructions is a sample program to enable practice — programming prior to testing on the real thing.

If a Programmable Interface is the sort that you require then this should be considered. It is slightly expensive in comparison to some of the updated and newer models now appearing, but nevertheless is a tried and tested product that has stood the test of time.
Mike Edmunds

The Cambridge Joystick Interface £34.95 (including joystick)

This interface has a through-port at the back which is very useful for using other units like speech or sound devices. The unit also has a lip on the front to help prevent "wobble" but if you have a non-standar keyboard it gets in the way.

There is the usual nine pi plug on the left hand side for th joystick and the overall size i 11.5cm × 3.5cm × 7.5cm.

To use the interface you hav to load a tape first which pro grams the interface to respon to the appropriate keys. If th game you're using fails to giv this information on the instruc tions then you have to load th game first to find out! However once you have programmed set of key-sequences, they ca be saved on tape (the revers side of the tape has been lef blank for this purpose and provi sion is also made for saving t microdrive) and many game can be saved at one time. Yo are able to check the joystic position at the end of the pro gramming sequence.

This interface is sold com plete with a joystick and tape the joystick is availabl separately and is reviewed a such.

The interface is a bit fiddly t use but has proved compatibl with all software tried, but wher an option of joystick or keyboar is offered from within a pro gram, you must use th keyboard one as the joystick op tion frequently does not work.
M J Maggs

Programmable Joystick Interface Downsway Electronics (UK) Ltd. £22.95

The Downsway Programmable Interface, which has bee available for quite some tim now, is at first sight rather plain black unit which plug directly into the Spectrum's rea expansion port. It measure 65 × 95 × 25mm and has dual-position switch on the rea and a standard 9-pin joystic socket on the right side of th unit. This is one of the advan tages that this Interface ha over some other units currentl available, in that the keyboard i left uncluttered by contro cables and therefore can be us ed in conjunction with th joystick. This gives the user wide range of control option which can be a distinct benef considering the handful of key that some programs demand. A small instruction sheet provide with the Interface gives all th information that is needed t make your joystick compatibl with any program.

Programming of the Interfac can be achieved either prior t

loading a game or after the game has loaded. This facility takes care of all those programs that have no detailed instructions on the cassette inlay. To use this unit is simplicity itself — with the dual position switch in 'program' mode press the key for the specified command and move the joystick to the appropriate position. Release joystick and key then repeat for all other movements. In essence that's all there is to it!

After programming (a few minutes work) switch to the 'play' mode and away you go!

In operation the unit performed perfectly and on the odd occasion when a mistake was made it was a simple matter to re-program the offending key without the necessity of going through the entire procedure again.

The FIRE command is independent of direction command and this means that FIRE has only to be programmed once, as opposed to the multiple movement/fire operations needed with some interfaces.

The unit was tested with several joysticks ranging from the cheapest to one of the most expensive available and it performed equally well with all, the only noticeable difference being a somewhat coarser movement with one of the cheaper joysticks. Of the many programs used with this interface only two gave any problems — keys could be programmed but pressing the firebutton caused the game to restart. As it happens the particular games weren't intended for joystick use anyway!

In conclusion, if a joystick interface is high on your list of priorities then it may well be worth your while paying a bit more for the extra flexibility that this excellent little unit provides.

Mike Edmunds

Fox Programmable Interface Fox Electronics Ltd. £34.95

I have used this unit consistantly over a four week period with a wide variety of games and I recommend it to anyone looking for such a unit.

It is a rather large unit and the long suffering DK'Tronics keyboard needed another bit removed before it would fit! The standard case presents no problems however.

The unit has a through port so you can use other interfaces behind it, the Currah micro speech unit worked fine at the back, and the standard 9 pin joystick socket is near the bottom of the right hand side of the case. Just above the socket is a small, two-way (up/down) switch. On power up the switch should be in the down position — switching it up instantly presents on screen a menu of 16 possible combinations of responses and options to create or select a set or to exit.

The more knowledgeable among you will have worked-out that the unit must contain a programmable chip of some sort. The program and set of key combinations are kept permanently refreshed by a battery which is constantly recharged.

What happens if something goes wrong?

The interface is supplied with a back up tape and also your own sets of positions can be saved on tape and easily reloaded into memory if needed. A few times I had to perform this operation due to the awkward fit with the keyboard but it was no real problem.

Documentation is good, covering all the operational details and also how to use it as a pseudo ROM. All in all easy to use and one of the most impressive joystick interfaces I've used.

AGF Programmable Joystick Interface £26.95

AGF sell a version of this interface for both the Spectrum and the ZX81 and both cost £26.95.

The interface works by duplicating the keyboard layout with a grid of wires. The wires ending in crocodile clips can be attached to the various grid wires to route specific keys to the joystick. This means that all games can be controlled by joystick although you must use the keyboard option and not the joystick one when provided.

The joystick is connected by a standard 9 pin D socket so it is compatible with the majority of the sticks on the market, two sockets are provided for two sticks for two players to play alternatively. Both sockets operate on the same keys and both sockets and the keyboard are always operative. A possible cause for dispute when used by two players! A set of quick reference cards, a demo tape and a stick on chart completes the package.

The sight of uncased wires and chips may put off some users, but treated reasonably, this is an almost foolproof method of providing joystick control to any game.

The unit has a through port and further peripherals can be added afterwards, I used a Centronics interface and a speech unit with it and had no problems.

Switchable Interface Protek Computing Ltd. £19.95

An interesting and unsual idea from Protek is to provide the ability to switch between the common interface options. The interface has a three way switch at the back marked, logically, 1, 2 and 3. Setting the switch will give you compatibility with Protek/AGF (cursor keys), Kempston and Sinclair Interface II formats respectively.

Between these three options I should think that around 90% of the software on the market can be used with this unit. The only programs which will cause problems are those where no joystick options are provided and keys other than the cursor keys are used, and there can't be many of those!

The case is quite small and neat with the usual 9-pin plug fitted in the right hand side of the unit. This is a handy position to allow the joystick lead to clear the keyboard.

The instruction leaflet is as I like them, written in a simple step by step manner with diagrams — if you get it wrong it certainly won't be Protek's fault.

My biggest criticism is the lack of a through-port, but with other devices available to compensate, it's not as drastic a problem as it used to be.

Using this is a delight, even though most programmables are quickly and easily programmed, sometimes it doesn't seem worth the bother. With this one, compatibility is usually available at the flick of a switch.

Firmware Programmer Interface £29.00 Software Programmer Interface £22.95 Voltmace Ltd.

Two other interfaces unseen by us. One is programmable by using a two-way switch and the other by using a program on tape. The most interesting item that I've seen from this company must be their Delta 3 joystick, which has a rectangular base, three fire buttons (to alow for individual styles of holding the thing), and a fingertip type joystick at £10.00.

Pace Computing

This company advertises a programmable interface for £26.00 which they say does not disable the keyboard and can be reprogrammed during a game. No further information is availabe so far.

East London Robotics Ltd. £15.00

Designed to be sold with their Trick Stick (of which we're still waiting for a review sample), it appears to be similar to the AGF programmable interface, in that flyleads which are connected to pins to mimic the keyboard are used.

If bought with the Trick Stick, then it will only cost £10.00, which can't be bad!

Dk'Tronics Ltd. £22.95

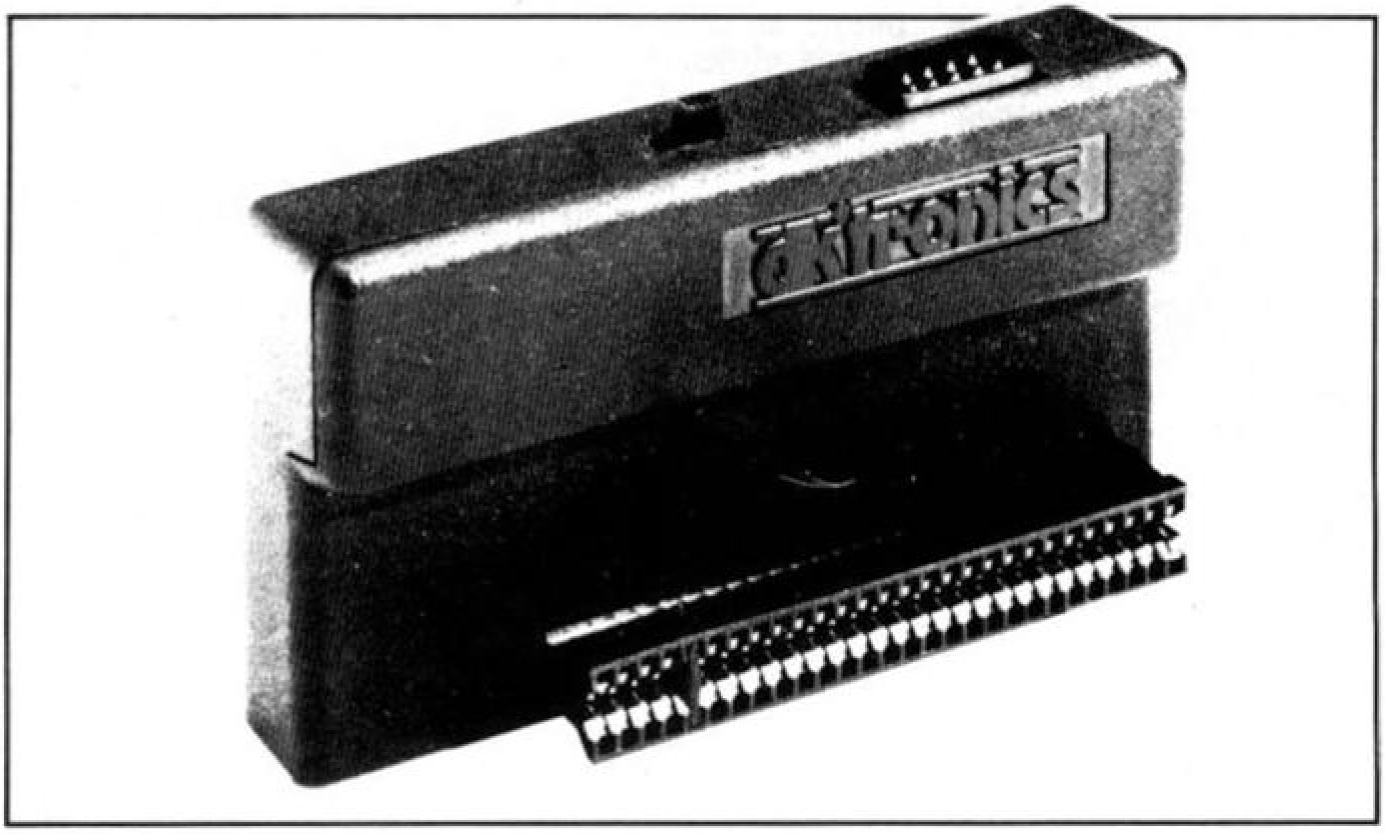
This is Dk'Tronics deluxe interface and is programmable from the keyboard by using the switch provided on the top of the unit, or via the program supplied on tape.

There is only one socket provided on this model, but as it is fully programmable there isn't any need for two separate sockets to cover the different methods of providing control. The socket is located on the top of the interface next to the switch.

During operation, the keyboard is still enabled so that complex games requiring more than five keys to be pressed can still be played.

At the time of going to press we haven't been able to obtain one because they're short of stocks, however Ms Green of the company assures me that by now their stockroom will be overflowing. The information given to me claims that movement in seventeen directions is possible, I will be most interested to put this through it's paces!

A full through port is included and it is claimed to be microdrive compatible, the usual lip at the top of the interface is there and I would also be interested in trying it for compatibility with one



of their superb looking keyboards.

Protocol 4
AGF Hardware
£30.95

The very latest unit from AGF, this is an interesting looking interface. It lies flat and is programmed by a set of reprogrammable cards which are snapped into place on the interface.

The device is supplied with three pre-programmed cards to cover Kempston, Sinclair and Protek/AGF (cursor keys). An extra, blank card is supplied for your own use.

This is a great advance on their older interfaces in style and ease of use, however, ZX81 owners will be pleased to know that AGF are to continue producing and selling their old units because, as Mr. Fosberry told me personally, the demand by ZX81 owners is as great as that from Spectrum owners.

The unit has a full through port and amazingly, up to five of these can be connected and programmed individually for multiple control! The latest Quickshot II joystick is supported and the socket for the joystick is placed on the side of the unit.

Yet another small but useful extra is a reset button to allow you to turn the computer on and off without having to pull the plug each time with the eventual problems this causes.

Slightly expensive but for the dedicated games player probably well worth the money.

Endnotes

We covered as many interfaces as we would and I'd like to thank all the companies that sent us review units which allowed us to write a more comprehensive and detailed report.

I do realise that, as always these are written by people who are giving their own opinions and you may or may not agree with them. Overall we have tried to give you an idea of what is available but really nothing substitutes for trying them for yourself at your nearest store.

There are probably a few companies that we've missed, if they would like to write and tell us, we'll include them in our future features.

Each review was written by the person named at the end, if no name appears then it was reviewed by myself — it's a hard life!

Addresses

AGF Hardware,
26, Van Gogh Place,
Bogner Regis,
West Sussex.

The Cambridge Joystick Interface,
40-42 Hobson Street,
Cambridge CB1 1NL.

CCI (Custom Cables International),
Units 2,3 and 4,
Shire Hill Industrial Estate,
Saffron Waldon,
Essex CB11 3AQ.

Datel Electronics,
Unit G,
Fenton Industrial Estate,
Dewsbury Road,
Fenton,
Stoke-on-Trent.

DK'Tronics Ltd.,
Unit 6,
Shire Hill Industrial Estate,
Saffron Waldon,
Essex CB11 3AQ.

Downsway Electronics (UK) Ltd.,
Depot Road,
Epsom,
Surrey.

East London Robotics Ltd.,
Gate 1,
Royal Albert Docks,
London E11.

Fox Electronics Ltd.,
141 Abbey Road,
Basingstoke
Hampshire.

Kempston Electronics,
Unit 30,
Singer Way,
Woburn Road Industrial Estate,
Kempston,
Beds. MK42 7AF.

Pace Computing,
28, Burwood Grove,
Mayling Island,
Hampshire.

Protek Computing Ltd.,
14 Young Square,
Brucefield Industrial Estate,
Livingston,
West Lothian.

Rainbow Electronics,
Glebe House,
South Leigh,
Witney,
Oxfordshire OX3 6XJ.

RAM Electronics (Fleet) Ltd.,
106 Fleet Road,
Fleet,
Hampshire GU13 8PA.

Sinclair Research,
Stanhope Road,
Camberley,
Surrey GU15 3PS.

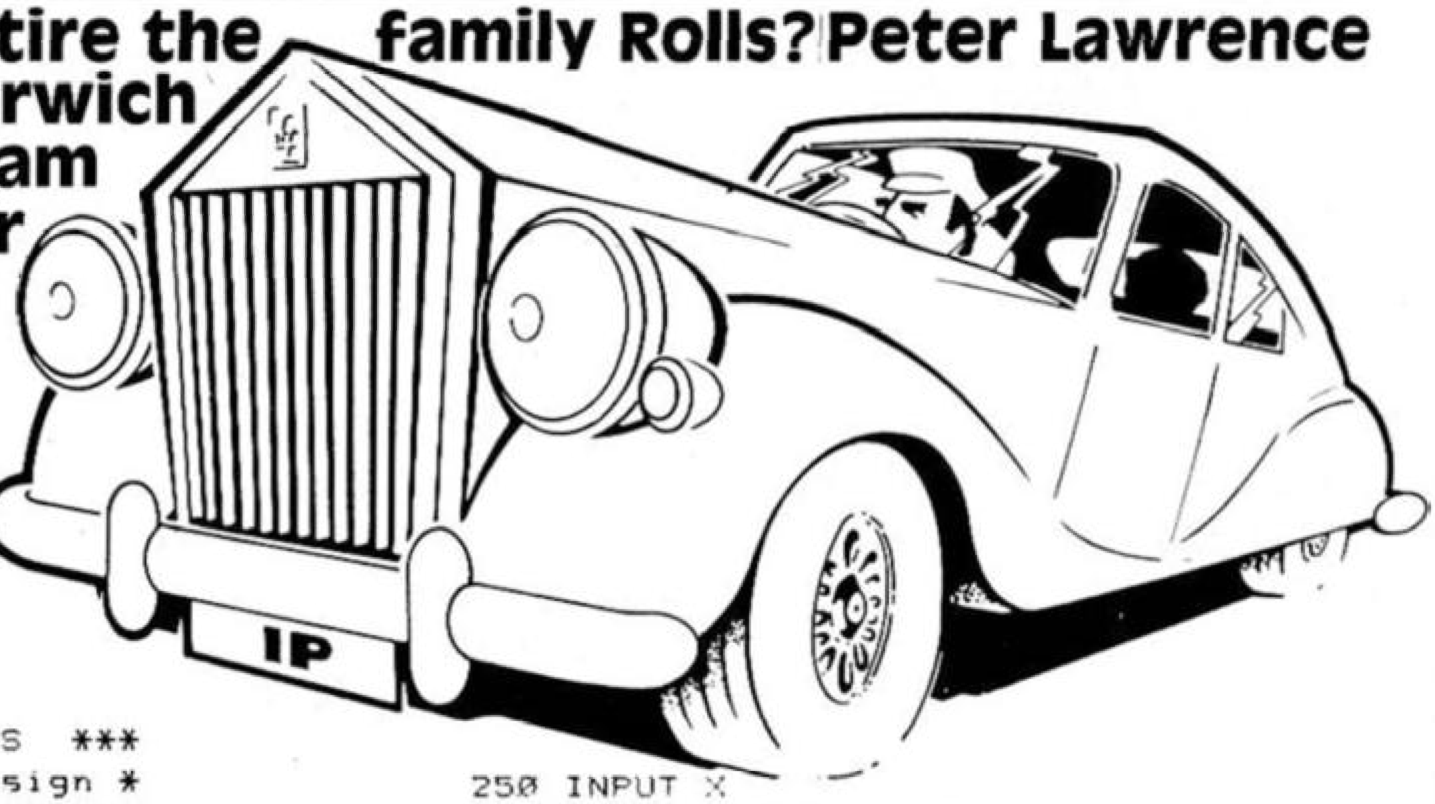
Solidisk Technology Ltd.,
Sinclair Computer Add-Ons Division,
17 Sweyne Avenue,
Southend-on-Sea,
Essex SS2 6JQ.

Stonechip Electronics,
Unit 9,
Brook Trading Estate,
Deadbrook Lane,
Aldershot,
Hants. GU12 4XB.

Voltmace Ltd.,
Park Drive,
Baldock,
Hertfordshire SG7 6ES.

Car Costs

Is it time to retire the family Rolls? Peter Lawrence drives from Norwich with his program for the ZX81 or Spectrum.



This is a simple but accurate and useful program for all motorists (or sons and daughters of motorists) to check upon how much the gasoline guzzling beastie is actually costing you. Note that the # sign in the listing should be replaced by the pound sign. Happy motoring!

```
 10 REM *** CAR COSTS ***
 11 REM * # is pound sign *
 12 REM ******************
 20 LET Y=365
 30 PRINT "MONTHLY CAR COSTS"
 40 PRINT
 50 PRINT "No. of days in month
 =";
 60 INPUT H
 70 PRINT H
 75 PRINT
 80 PRINT "MONTHLY FUEL CONSUMP
TION"
 85 PRINT
 90 PRINT "Miles travelled
 =";
100 INPUT M
110 PRINT M
120 PRINT "Litres petrol purcha
sed=";
130 INPUT L
140 PRINT L
150 PRINT "Cost of petrol
 =";
160 INPUT P
170 PRINT "#";P
180 LET G=L*.22
190 LET Z=INT (M/G*100+.5)/100
200 PRINT
210 PRINT Z;"Miles per gallon"
220 PRINT
230 PRINT "ANNUAL COSTS"
235 PRINT
240 PRINT "Car tax
 =";
250 INPUT X
260 PRINT "#";X
270 LET A=X
280 PRINT "R.A.C. subscription
 =";
290 INPUT R
300 PRINT "#";R
310 LET A=A+R
320 PRINT "Car insurance
 =";
330 INPUT I
340 PRINT "#";I
350 LET A=A+I
360 PRINT "Repairs and service
 =";
370 INPUT S
380 PRINT "#";S
390 LET A=A+S
400 PRINT "Tyre replacement
 =";
410 INPUT T
420 PRINT "#";T
430 LET A=A+T
440 PRINT "Depreciation
 =";
450 INPUT D
460 PRINT "#";D
462 PRINT
465 LET A=A+D
500 LET C=A/Y*H
510 LET B=C+P
520 LET E=B/M
530 PRINT "Car running cost=";I
NT (E*10000+.5)/100;"p per mile"
```

Portability 2

M P Moore of Petron Electronics
describes the construction of a parallel I/O board for use with the Portability Interface

In this issue we show you how to build a parallel interface board to be used in conjunction with the interface published in the last issue. The Parallel In/Out Board has two 8 bit input and two 8 bit output ports. We also describe an LED board, which allows your computer to light LEDs (Light Emitting Diodes) from the output ports, and another board containing four relays which can be switched on and off by your computer.

Up to four of these parallel interface boards could be connected to the interface giving a total of 64 input and 64 output lines (eight, 8 bit input ports and eight, 8 bit output ports). The really dedicated enthusiast could use the interface to control 64 relays...

Important note

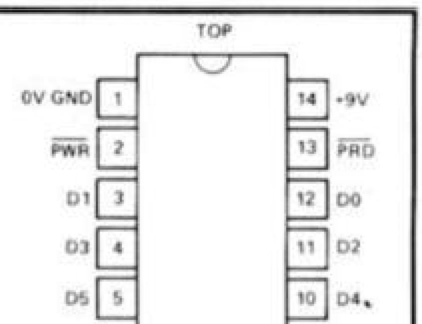
Since publication of the first part of this project, the design of the PCB has been changed slightly. Although the ICs on the main interface board still draw their 5 volt supply from the computer, this 5 volt line is no longer taken to the four I/O sockets; instead the 9 volt line is used, requiring each additional board to have its own 5 volt regulator. This is to reduce the load on the computer's 5 volt regulator. In addition — as a safety precaution — the positions of $\overline{PWR}$ and GND have been swapped over. Table 1 gives the revised I/O socket connections. All PCBs supplied by Newtech contain the altered circuit.

The revised copper foil layout for the main interface PCB is shown in Fig. A.

Four circled areas indicate where changes have been made. The link next to SK4 is dispensed with and pin 14 of each extension socket is taken to +9V rather than +5V via a new track which runs down the right-hand side of the PCB. +5V now goes no further than the link above IC2. OV/GND is taken to pin 1 of each extension socket rather than pin 2 and pin 2 is connected to $\overline{PWR}$, the port write line.

For those who have already made their own PCB from the layout in the first part of this project, Fig. B shows the alterations that must be made.

There are three tracks (marked with an X) to be cut and three new links marked A, B and C to be fitted. Use insulated wire, especially for the 9V lead from the edge connector. The points where new links must be fitted are marked, A, B and C; connect them so that A joins to A, B joins to B and C joins to C. Note that one end of A connects to pin 2 of SK1; one end of B connects to pin 1 of SK4 and that C (the 9V lead) connects to SK4 pin 14 and the previously unused 9V pin of the edge connector.



SKT	PIN 7	PIN 8
1	$\overline{PE1}$	$\overline{PE0}$
2	$\overline{PE2}$	$\overline{PE3}$
3	$\overline{PE6}$	$\overline{PE7}$
4	$\overline{PE5}$	$\overline{PE4}$

Table 1. Revised I/O socket connections.

Parallel board connections

Fig. 1 shows how the paralle In/Out board could be con nected.

Output port A is shown con nected to an LED board contair ing 8 LEDs. +5V (VCC) and 0 (GND) are taken to the boar along with the eight outputs.

0.1 inch PC plugs an sockets (supplied with the kit are used to connect the paralle board to external circuits.

Each output is connected vi a resistor to an LED; the LED can be connected so that the indicate either a 1 or a 0. If the were wired to indicate a 1 an the number 200 (for instance were to be output to port A, the

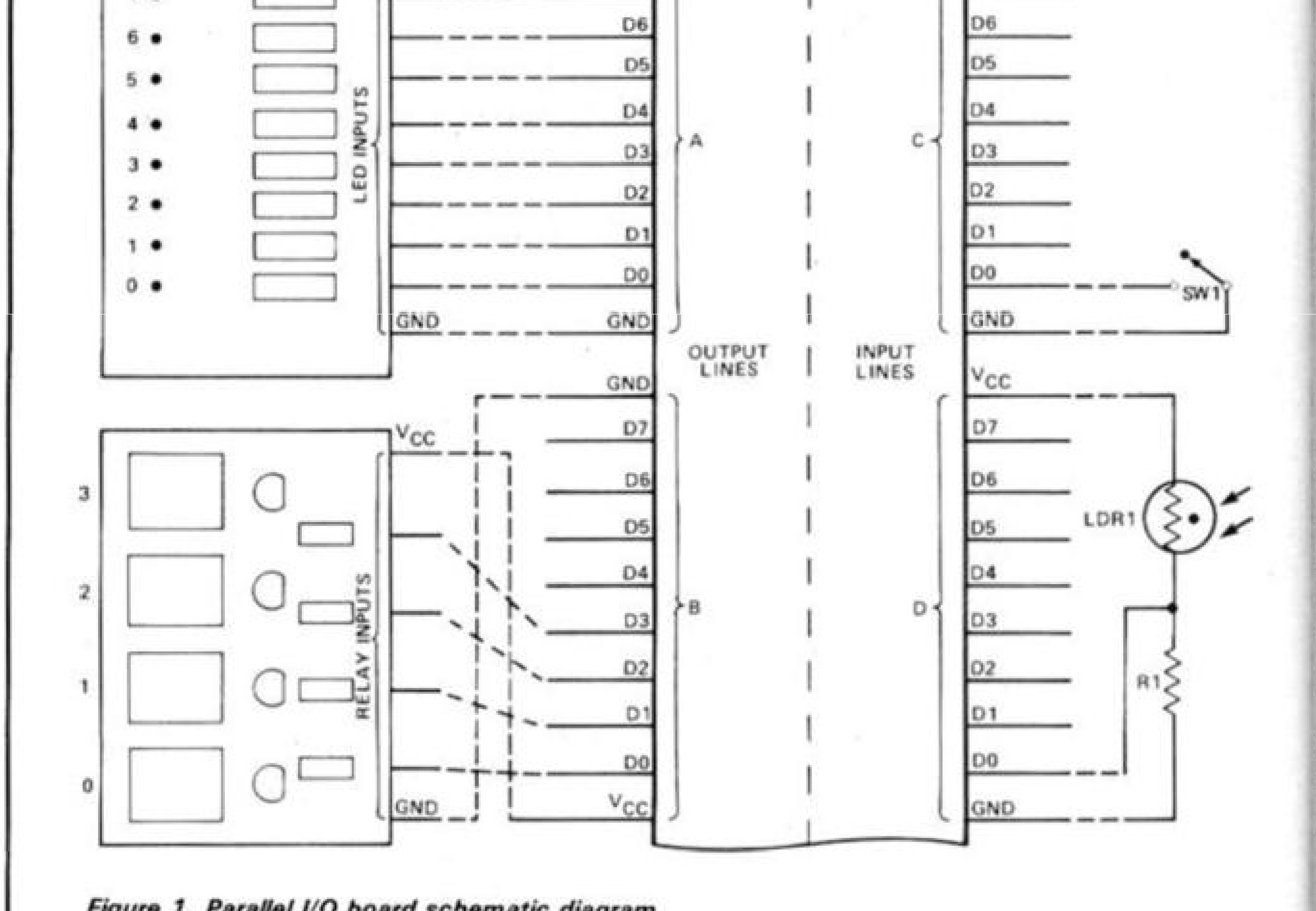
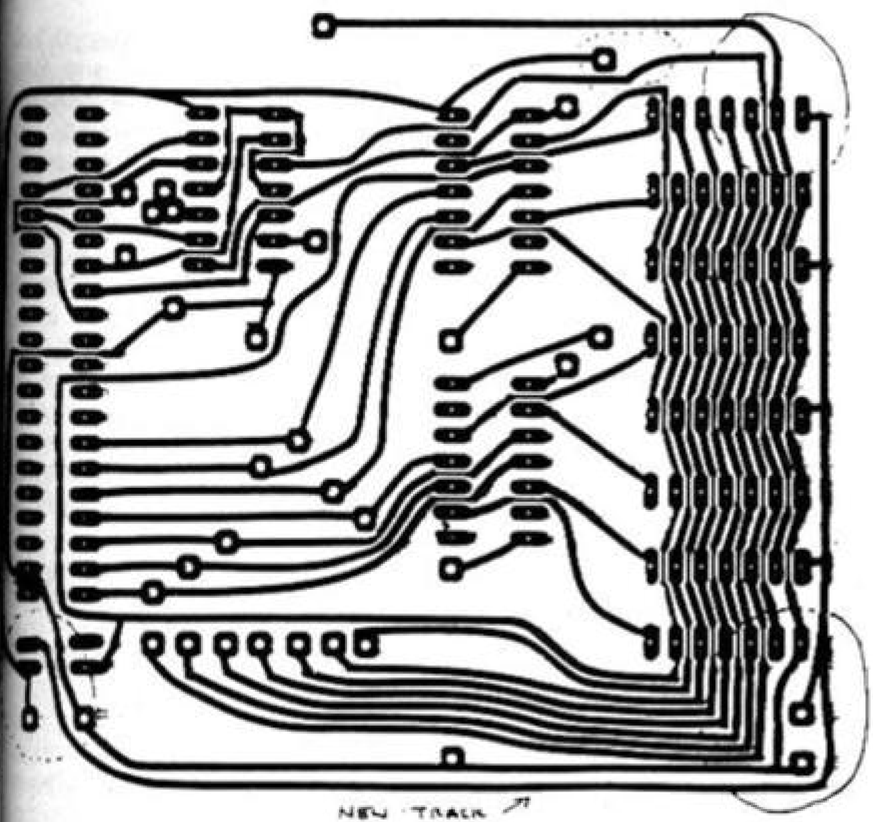


Figure 1. Parallel I/O board schematic diagram.



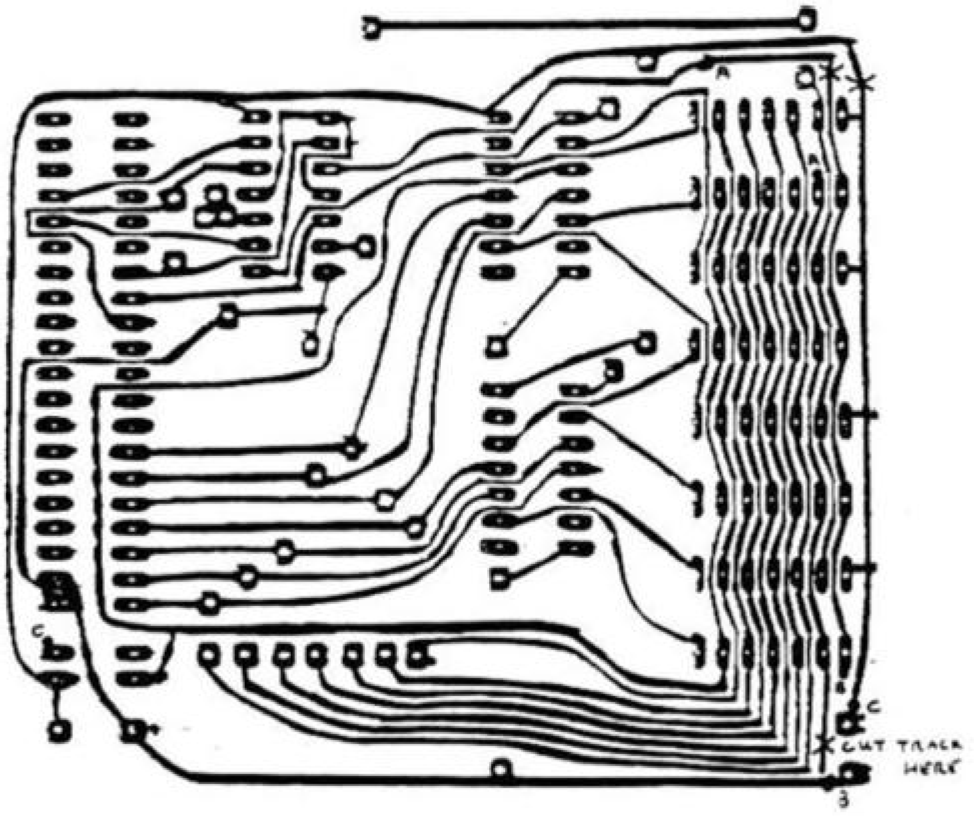


Figure A. *Revised PCB foil pattern.* *Figure B.*

LEDs 7, 6 and 3 would light since 200, in binary code is 1100 1000.

The LED board could be used to display numbers in the range 0 to 255 in binary code, output to port A (or B).

Output port B is connected in a similar way to a relay board containing four miniature relays – again, note the VCC and GND connections. Outputting a 1 to a relay will turn that relay on: if you wished to switch relay2 on, you would output the number 4 which is 0000 0100 in binary; to switch on relays 1 and 2 you would output the number 6 which is 0000 0110.

A method of connecting external switches to the board is shown at port C. Unconnected inputs will always read as 1. When the switch is closed (on), D0 will be taken to GND which is logic 0 and the value read in from port C will be 1111 1110 or 254. With the switch open (off), the value returned would be 1111 1111 or 255.

Light detector

Port D is shown connected as a light detector. An LDR is a Light Dependent Resistor; the resistance of this component alters with the ambient light level. At low light levels the LDR will exhibit a high resistance which falls as the light increases.

LDR1 and R1 are wired so that when the light level is high D0 will be at logic 1 and as the light level falls and the resistance of the LDR rises above that of R1, D0 will be pulled to GND (logic 0). This circuit could be used as a daylight detector which will return the value 255 in full daylight and 254 in darkness. Since daylight comes and goes gradually, there will be a certain point where LDR1 and R1 have about the same resistance and D0 will alternate between 0 and 1; software written for use with the circuit would have to take this into account.

Programming the parallel interface board

The parallel interface board connects to the main interface published in the last issue via a 14 way DIP jumper cable. Depending on which of the four DIP sockets on the main board is used, each of the ports on the parallel board will have a number to identify it (See Fig.2).

Each port is marked A,B,C or D. Table 2 gives the number of each port, A, B, C & D depending on the DIP socket used.

It is important to ensure that the DIP jumper plugs are the same way round on each board; the wire at the *top* end of the socket on the main interface board must be the wire at the *top* end of the socket on the parallel board. Since multicolour ribbon cable is used for the jumper cables, this is not difficult to check.

Let us suppose that the DIP jumper cable connects the parallel interface board to main interface socket 1:

For the SPECTRUM

To output data to the parallel output port marked 'A' (Fig. 2) and to input data from port 'D':

OUT 65407, 254 (selects ports A & D)
OUT 65471, x (outputs the contents of variable x to port A)
LET A = IN 65471 (reads the data on the input port D to variable A)

The following program will display a count from 0 to 255 in binary code on 8 LEDs connected to output port A.

```
10 OUT 65407, 254
20 FOR F=0 TO 255 : OUT
   65471,F : PAUSE 20 :
   NEXT F
```

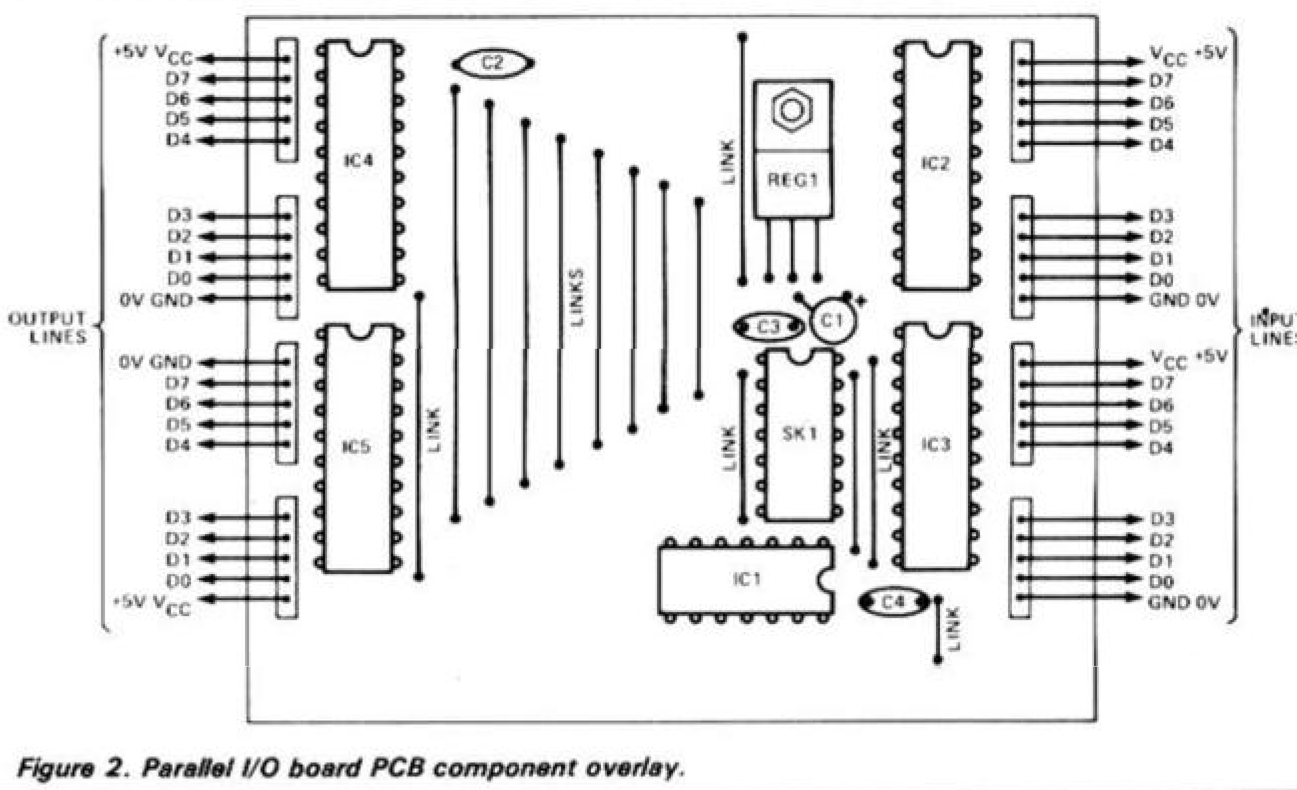


Figure 2. Parallel I/O board PCB component overlay.

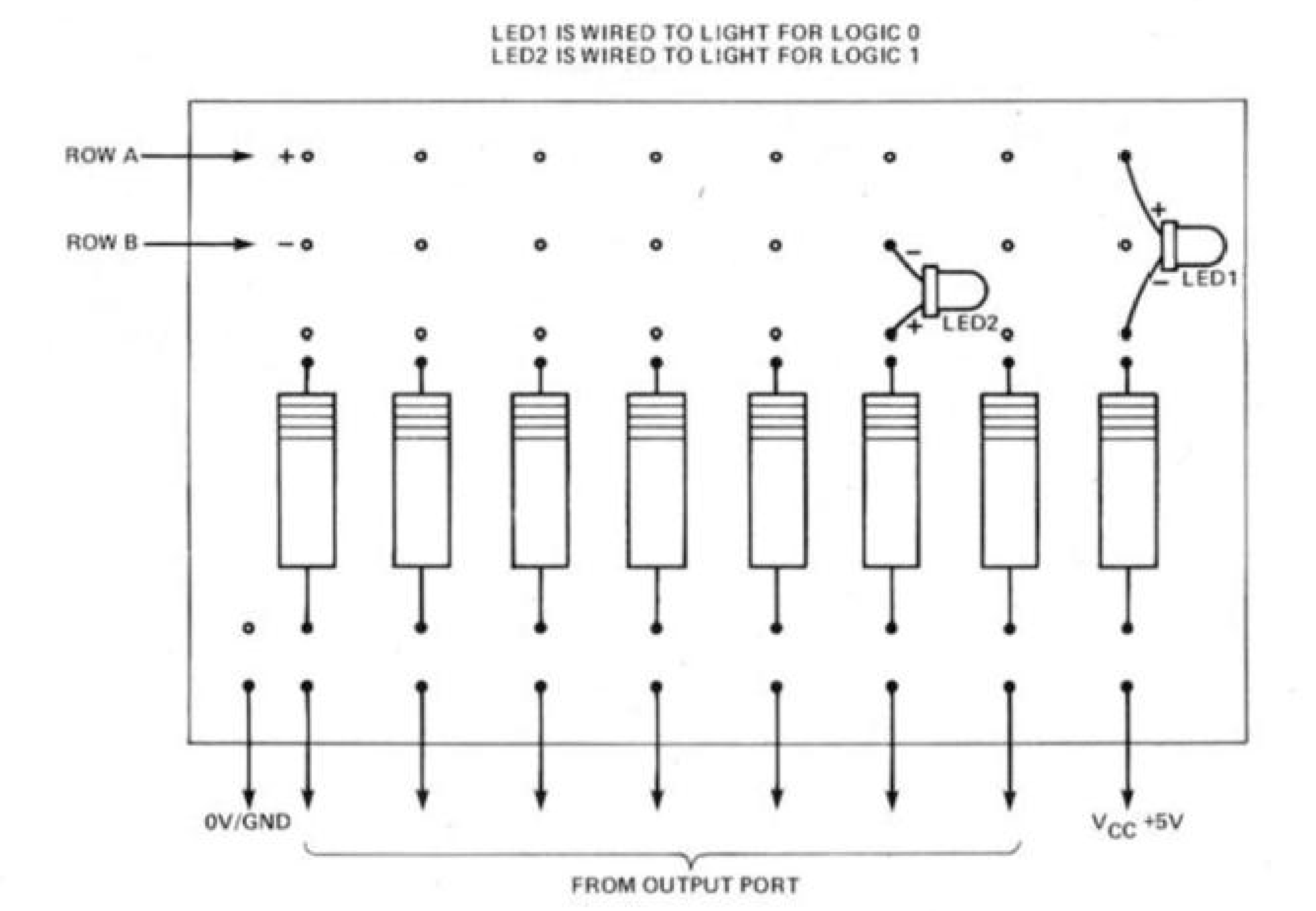


Figure 3. LED board component overlay.

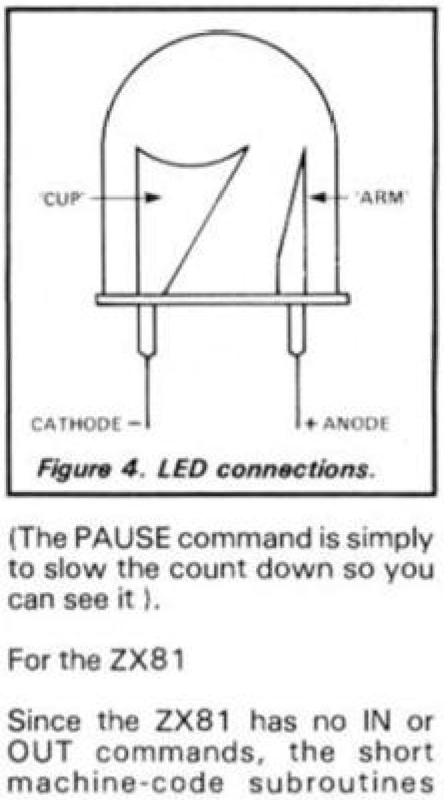


Figure 4. LED connections.

(The PAUSE command is simply to slow the count down so you can see it).

For the ZX81

Since the ZX81 has no IN or OUT commands, the short machine-code subroutines demonstrated in part 1 of this project must be used.

The following program will count from 0 to 255 and will display the count on 8 LEDs connect to output port A.

```
 1 REM (machine code)
10 POKE 16515,254
20 RAND USR 16514 (to
   select device 254 i.e.
   ports A and D
30 FOR F=0 TO 255
40 POKE 16520,F
50 RAND USR 16519 (to
   output the value of F,
   POKEd in line 40)
60 NEXT F
```

To input data use:

POKE 16515,n (where n is the device number)
LET A=USR 16524

The data on the inputs of the selected input port will be returned in A; if the number POKEd to 16515 were 253, then data would be input from port C (still assuming the parallel board is connected to SK1 on the main interface board).

Parallel input/output board construction

See Fig. 2 (PCB Overlay)

Using thin, single core insulated wire, solder wire links between the points marked, one at a time. There are fourteen links in all. Be very careful not to allow solder to bridge across any of the tracks which run close to to link pads.

IC sockets should be used for all five ICs plus one for the DIL plug from the main interface board. Solder these in one at a time, again watching out for solder bridges onto tracks which pass between IC pins.

The voltage regulator, Reg.1, should be soldered next. It is very important to mount this component the right way round (otherwise the board will not work). Insert is so that the **flat**, all-metal side **faces** ICl and SK1.

Next solder capacitor C1. This is a large tubular component, it must be mounted the right way round (see overlay). C1 will have one lead marked (either the negative lead (−) or the positive lead (+) so you can see which way round it should go. Don't push this component right into the board, rather leave it standing about ¼" above the PCB surface. It is a good idea to put a small piece of insulating tape around C1s leads so that they will not short against each other or, against any other component.

Solder in the three 0.1uF capacitors, C2, C3 and C4. These components can be mounted either way round.

Finally, solder the right-angle PCB plugs (the shorter end goes through the PCB leaving the long ends pointing out to the sides of the board). There are eight of these plugs altogether, each plug consisting of five pins.

Before plugging in the ICs check the board thoroughly to ensure that all connections have been soldered and that there are no bridges across any of the PCB tracks.

Now plug the ICs in, one at a time making sure you mount them the right way round. The top end of each IC is marked with a deep notch or circle cut into the plastic, these correspond with the 'top ends' marked on the PCB overlay. If a circle is cut into each end, and there is no notch, the deeper circle marks the top end.

Construction of the LED board

This board has been designed to allow LEDs to be mounted in such a way that they will either indicate a logic 1 state or a logic 0 state. See Fig. 3.

First of all, solder the eight resistors (330R). These are small tubular components with coloured bands (indicating their value). They can be mounted either way round.

LED1 is connected between the top row of holes (Row A) and its associated resistor and will light up when the output port line, connected to the other end of its resistor is at logic 0.

LED2 is connected between

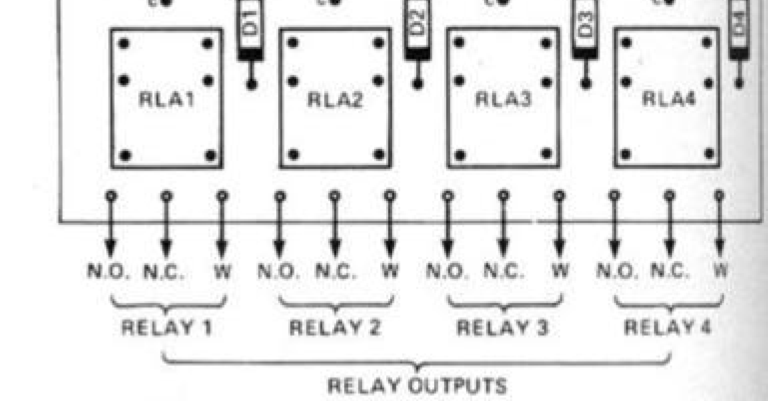


Figure 5. PCB component overlay.

the middle row of hole (Row B) and its resistor; it will light up when the logic level on the other end of its resistor is 1.

It is very important that LEDs be mounted the right way round. Look at Fig. 4.

If you hold an LED up to the light you will be able to see the ends of its leads inside the plastic case. One of these will resemble a 'cup' and the other will appear to be a smaller, shorter 'arm'. The 'cup' is always the Cathode or negative (−) terminal, while the 'arm' is the Anode or positive (+) terminal.

When you solder the LEDs in, you may choose any combination of logic level indication (ie. as in LED1 or LED2) though it is usually more useful to have all eight LEDS indicating the same logic level (1 or 0).

Remember that when an LED is connected between row A and its resistor the positive lead MUST go to row A; the negative lead to the resistor: When an LED is connected between row B and its resistor the negative lead MUST go to row B; the positive lead to the resistor.

Don't experiment by connecting an LED between row A and Row B — at best you will destroy the LED...

When you have decided how you wish to mount the LEDs, insert and solder them, one at a time.

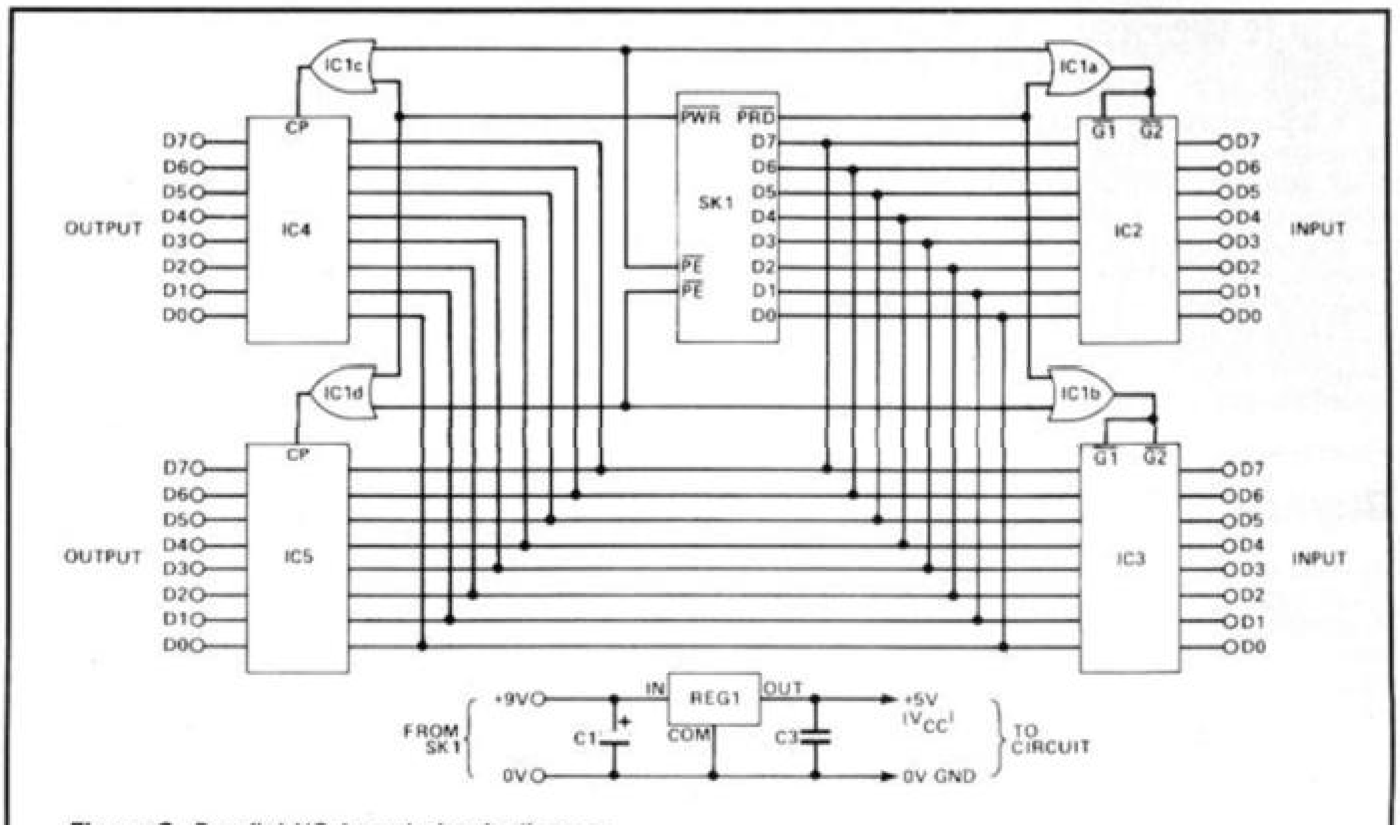


Figure 6. Parallel I/O board circuit diagram.

Using the relay board

Each relay has three contacts see Fig. 5 marked N.O. (Normally Off), N.C. (Normally Connected) and W (Wiper or common contact).

When a relay is de-energised (switched off) the wiper makes contact with the N.C. terminal. When energised, the wiper connect to the N.O. terminal instead.

You can switch small DC motors, bulbs etc. on and off with these relays but they must NOT be used to switch the mains under any circumstances.

Relay board construction

See Fig. 5

First of all, insert and solder the four relays.

Each relay has a driver transistor (TR1 to TR4), these are small, black plastic encased components with three leads. They should be mounted so that the flat side of the transistor faces **away** from the relay, the three terminals being taken through the three holes as shown. The middle transistor lead (C — the Collector) is slightly nearer the relay than the other two leads (B — Base and E — Emitter). Solder the transistors taking care to mount them the right way round.

Next, diodes D1 to D4 should be fitted. These are tiny glass-cased components with a black band near one lead which indicates the Cathode or negative lead. Be sure to mount these components the right way round. In each case, the Cathode is the lead nearest to the relay.

Finally, insert and solder resistors R1 to R4 (560R). These components are larger than the four diodes and have coloured bands which indicate their value.

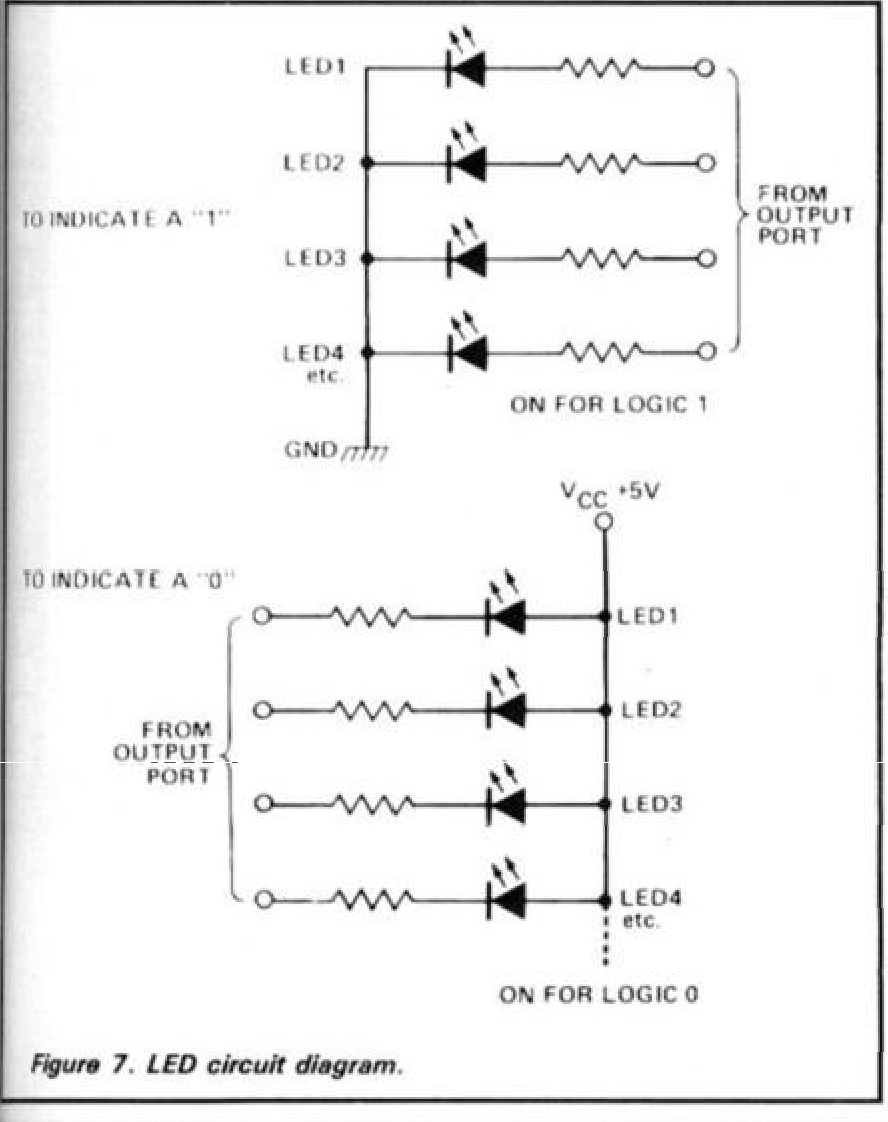


Figure 7. LED circuit diagram.

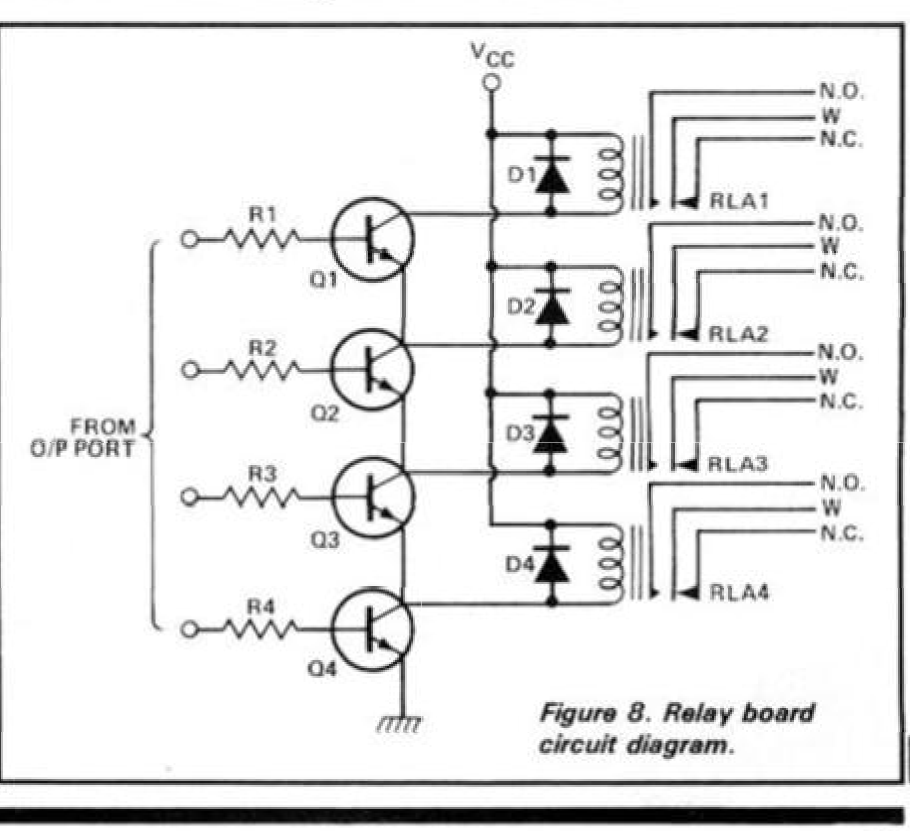


Figure 8. Relay board circuit diagram.

How it works

See Fig 6.

ICs 2 and 3 are 81LS97 octal tri-state buffers which have their outputs connected to the computer data bus. When $\overline{\text{PRD}}$ and (one) $\overline{\text{PE}}$ line go low, one of these buffers will be enabled, causing the data on its inputs to be placed on the data bus. Should both $\overline{\text{PE}}$ lines go low (as could happen), the result would be indeterminate since this would give rise to data bus contention (Not very desirable).

ICs 4 and 5 are octal tri-state latches whose output enable lines are tied to GND. Data is latched into these 74LS374 chips on the low to high transition of CP, the clock input driven by a $\overline{\text{PE}}$ line and $\overline{\text{PWR}}$.

The board's 5 volt line is derived from the computer 9V line by a 5 volt regulator. Since this regulator will tend to run hot, especially if many relays are to be controlled by the computer, it is a good idea to fit a small heatsink to it; in any case if very many relays are to be controlled, a larger external power supply would have to be used.

Buylines

All the components used in this project with the exception of the PCBs are available through electronic component suppliers who advertise regularly in electronics magazines.

The PCBs are available from Newtech (Micro) Developments Ltd., 1, Courtlands Road, Newton Abbot, Devon. The Parallel Board costs £4.50, the LED board 85p, and the Relay Board £1.05.

Newtech will also supply complete kits of parts for this project which include the PCB and all components. The Parallel Board costs £14.95, the LED board £2.50, and the Relay Board £11.95. Postage is extra at 30p per order.

Table 2.

	PORT			
	OUT		IN	
SKT.	A	B	C	D
1	254	253	253	254
2	247	251	251	247
3	127	191	191	127
4	239	223	223	239

Parts list

Parallel In/Out Board

IC1	74LS32
IC2,3	81LS97
IC4,5	74LS374
REG.1	7805 + 5V regulator
C1	220uf 16v electrolytic
C2,3,4	0.1uf ceramic
4, 20 pin IC sockets	
2, 14 pin IC sockets	
8, 5 way PC plugs and sockets.	
1 PCB	

LED Board

LED 1-8,	TIL 209 or equivalent
R1-8	330R 5%
1 PCB	

Relay Board

RL1-4	Subminiature PC mounting relays — 5 volt 56R
TR1-4	2N3704
D1-4	1N4148
R1-4	560R 5% ⅓W
1 PCB	

Card Corner Patience III

This issue, Colin Gooch presents us with his version of 'eleven-up' Patience.

Card games are often good starting points for micro simulations. In particular Patience games are good for they are already designed for one player. I find programming them a fascinating insight into the working of the brain. It is amazing how many factors we take into account when we so simply look at a card and decide that it will "go". The same decision may well take several subroutines each involving several variables and loops.

Criticism is sometimes levelled at such simulations that they are pointless because you can just as easily use a pack of cards. That may be true, but it has many parallels in other branches of life..... Why get out the vacuum cleaner when it might be just as quick to use a brush? Anyway a table to play on is not always available, and if you are ill in bed its much easier to balance a spectrum on your knee than a large tray.

One major decision to take is to decide just how much we allow the computer to do. It would be quite easy to write a program and simply watch the Spectrum play by itself. It's best I believe, to allow the player to do quite a lot, but to reject faulty inputs. With an actual pack of cards you can go back and correct your error if for instance you misread a heart for a diamond. You cannot do this without breaking into a progam so it is best to avoid the problem. At the same time we need to allow unwise but not illegal moves.

I hope you enjoy the intricacies of long strings of cards.....

Happy programming.

Ray Elder

11 Up Patience

This is one of the simplest of the great family of patience games, and depends entirely on the run of the cards, but it can still be quite frustrating and will practice your powers of mental arithmetic!

```
1340 IF (F$="8")+(F$="9")+(F$="
") THEN PRINT AT Y+1,X+2;E$;AT Y
+1,X+4;E$;AT Y+5,X+2;E$;AT Y+5,X
+4;E$
1350 IF (F$="") THEN PRINT AT Y
+3,X+2;E$;AT Y+3,X+4;E$
1360 IF F$="J" THEN PRINT AT Y+1
,X+3;"   ";AT Y+2,X+4;"  ";AT Y+3,
X+4;"  ";AT Y+4,X+2;"   ";AT Y+5,
X+2;"  "
1370 IF F$="Q" THEN PRINT AT Y+1
,X+2;"   ";AT Y+2,X+2;"   ";AT Y
+3,X+2;"   ";AT Y+4,X+2;"   ";AT
Y+5,X+2;"   ";AT Y+6,X+3;"  ";AT
1380 IF F$="K" THEN PRINT AT Y+1
,X+2;"   ";AT Y+2,X+2;"   ";AT Y+
3,X+2;"   ";AT Y+4,X+2;"   ";AT Y+
5,X+2;"   "
1390 RETURN
1400 REM SET UPPACK
1410 LET A$="": LET D$="A0120230
3404505606707808909 10J11012K13"
```

Nine cards are dealt out and you must endeavour to get rid of the rest of your cards by covering either pairs of cards that total 11 or a run of J,Q,K. If you can't go you may deal one card on the centre. If you are still stuck then you must resign.

The first thing that we must do before programming a card game is to decide on the presentation of the cards. A nine by five block of print positions will allow for a very realistic layout but unfortunately restricts the number of cards that can be shown in full to a maximum of two rows of four (or five if you omit gaps between). This game needs a display of nine cards and to allow for an attractive deal I have made a five by seven matrix the order of the day. This means that the pips on the cards are not in quite the traditional places but I think they are still acceptable.

The cards are represented in memory by five characters and are held in a main string P$ in which they are dealt and shuffled. Each card is made up of a first character giving its 'name', the next two its value, the next the suit and finally the colour.

Programme operation

When loaded the programme will auto run and set up the graphics using line 1760 onwards. The main programme will then 'RUN'.

The first operational line is 1020 which produces two defined functions to locate the printing of the cards to x and y coordinates. The main loop, which is quite long starts at 1040. It first of all gives you the choice of instructions held in lines 1600 onwards, then initialises some variables line

```
1620 BORDER 2: PAPER 3: INK 1: C
1600>REM INSTRUCTIONS
1610 LET T$="
UP 11-U
"
1620 BORDER 2: PAPER 3: INK 1: C
LS : PRINT AT 7,0; BRIGHT 1;T$:
FOR N=5 TO 15 STEP 10: PRINT AT
N,8; INK 0; PAPER 6; BRIGHT 1; F
LASH 1;" P A T I E N C E ": NEXT
N
1630 PRINT #1;AT 0,0;"FOR INSTRU
CTIONS PRESS ""1""";AT 1,0;"OTHE
RWISE ANY KEY": PAUSE 0: IF INKE
Y$<>"1" THEN RETURN
1640 CLS : PRINT AT 1,5; INK 6;"
 11-UP PATIENCE: RULES": PAUSE
```



1710 and sets up and shuffles the pack in lines 1400 and 1490.

Line 1060 will print out a hand using the card printing subroutine at line 1250. You're then asked to input your move. The lines from here up to 1210 check that this is a valid combination. If all is well then your move is printed and we loop back to the beginning. If it is a faulty input you will be asked to enter again. If you have run out of cards or resigned you will be directed to the end game routine at line 1510.

The spectrum keeps track of what cards are dealt by using an array R$. I have done this rather than using the SCREEN$ function to read the value as '10' is a U.D.G. which this will not recognised.

The subroutine to print out the cards runs from line 1250. It breaks down the card into its various components (the string slicing ability is excellent for this purpose) and uses these to print the correct card, the place being given by the two defined functions. Picture cards are shown as letters.

Main variables

A	counts out cards in deal
CD	cards played
FA	temporary flag
N	for next loops
T	total value of cards to cover
x,y,	position on screen
z(x)	values derived from Z$
A$,B$,D$	setting up pack
C$	card being printed
E,F$	components of C$
P$	pack
R$(x)	cards dealt
Z$	your move
T$	title
U$	instructions

Memory

This program will easily fit into 16K.

All that remains now is to type it in. Debugging should not be difficult. If you get 'funny' cards then your error is almost certainly from line 1250 onwards. If it's rejecting a legitimate move then its in the main loop..... have PATIENCE and it'll all be OK.!

```
1000 REM //////////////////////
///PATIENCE B  @ C.N,G00CH//////
////////////////// 1983 ////////
///////////////////////////////
1010 REM **********************
****GRAPHIC REPRESENTATION******
********************************
****IN LINES WITH USER GRAPHICS
*******THESE ARE SHOWN AS ITALIC
 UPPER CASE*********************
********************************
***FOR THE CHUNKY GRAPHICS THOSE
 UNSHIFTED ARE SHOWN AS ITALIC 1
2345678 AND THOSE SHIFTED AS ITA
LIC LOWER CASE******************
********************************
1020 DEF FN C(X)=6*(X=2 OR X=6)+
12*(X=9)+18*(X=3 OR X=7)+24*(X=4
 OR X=8): DEF FN D(X)=2+6*(X>4)+
6*(X>4 AND X<9)
1030 RANDOMIZE : RANDOMIZE
1040 GO SUB 1600: BORDER 4: PAPE
R 4: INK 0: CLS : GO SUB 1710: G
O SUB 1400: GO SUB 1500
1050 REM PRINT STARTING HAND
1060 LET A=1: FOR N=1 TO 44 STEP
 5:: LET X=FN C(A)+2: LET Y=FN D
(A)+7: PRINT AT Y,X; PAPER 6; IN
K 0;" ";A;" ": LET A=A+1: NEXT N
1070 LET A=1: FOR N=1 TO 44 STEP
 5: LET X=FN C(A): LET Y=FN D(A)
: LET C$=P$(N TO N+4): LET R$(A)
=C$(2 TO 3): GO SUB 1260: LET A=
A+1: NEXT N: LET CD=9
1080 LET P$=P$(46 TO )
1090 PRINT AT 21,13; PAPER 5; IN
K 0;"      ";AT 19,13;"CARDS";AT
20,13;"LEFT ";AT 21,15;52-CD: IN
PUT ;AT 0,0;"ENTER POSITION OF C
ARDS TO BE";AT 1,0;"COVERED eg.
35 (0 TO RESIGN)"; LINE z$: IF Z
$="" THEN GO SUB 1230
1100 IF LEN Z$>3 THEN GO SUB 123
0: GO TO 1100
1110 DIM Z(LEN Z$): FOR N=1 TO L
EN Z$: IF CODE Z$(N)<48 OR CODE
Z$(N)>57 THEN GO SUB 1230: GO TO
 1100
1120 LET Z(N)=VAL Z$(N): NEXT N
 : IF LEN Z$=1 AND Z$(1)<>"9" AN
D Z$(1)<>"0" THEN GO SUB 1230: G
O TO 1100
1130 IF LEN Z$=2 THEN LET FA=0:
IF Z(1)=Z(2) THEN GO SUB 1230: G
O TO 1100
1140 IF LEN Z$=3 THEN LET FA=0:
IF (Z(1)=Z(2))+(Z(1)=Z(3))+(Z(2)
=Z(3)) THEN GO SUB 1230: GO TO 1
100
1150 IF VAL Z$=0 THEN LET RES=1:
 GO TO 1510
1160 IF FA THEN GO SUB 1230: GO
TO 1100
1170 IF LEN Z$=1 THEN LET FA=FA+
1
1180 FOR N=1 TO LEN Z$: LET T=T+
VAL R$(Z(N)): NEXT N: IF T<>11 A
ND T<>36 AND LEN Z$<>1 THEN GO S
UB 1230: LET T=0: GO TO 1100
1190 IF T=11 AND LEN Z$<>2 THEN
GO SUB 1230: LET T=0: GO TO 1100
1200 IF T=36 AND LEN Z$<>3 THEN
GO SUB 1230: LET T=0: GO TO 1100
1210 FOR N=1 TO LEN Z$: LET C$=P
$(1 TO 5) : LET P$=P$(6 TO ): LE
T CD=CD+1: IF CD=52 THEN GO TO 1
510
1220 LET X=FN C(Z(N)): LET Y=FN
D(Z(N)): GO SUB 1260: LET R$(Z(N
))=C$(2 TO 3): NEXT N: LET T=0:
GO TO 1090
1230 INPUT ;AT 0,0;"INPUT UNACCE
PTABLE";AT 1,0;"PLEASE ENTER AGA
IN"; LINE Z$: IF Z$="" THEN GO T
O 1230:
1240 RETURN
1250 REM PRINT CARD
1260 INK VAL C$(5): LET E$=C$(4)
: LET F$=C$(1)
1270 PAPER 7: FOR M=Y TO 8+12*(Y
>10)+6*(Y=8): PRINT AT M,X+1; IN
```

```
K Ø;"      ": NEXT M: PRINT AT Y,
X+1;F$;AT Y+6,X+5;F$
128Ø PRINT AT Y+1,X+1;E$;AT Y+5,
X+5;E$
129Ø IF (F$="A")+(F$="3")+(F$="5
")+(F$="9") THEN PRINT AT Y+3,X+
3;E$
13ØØ IF (F$="2")+(F$="3") THEN P
RINT AT Y+2,X+3;E$;AT Y+4,X+3;E$
131Ø IF (F$="4")+(F$="5")+(F$="8
")+(F$="9")+(F$="A") THEN PRINT
AT Y+2,X+2;E$;AT Y+2,X+4;E$;AT Y
+4,X+2;E$;AT Y+4,X+4;E$
132Ø IF (F$="6")+(F$="7") THEN P
RINT AT Y+1,X+2;E$;AT Y+1,X+4;E$
;AT Y+3,X+2;E$;AT Y+3,X+4;E$;AT
Y+5,X+2;E$;AT Y+5,X+4;E$
133Ø IF (F$="7") THEN PRINT AT Y
+3,X+3;E$
134Ø IF (F$="8")+(F$="9")+(F$="A
") THEN PRINT AT Y+1,X+2;E$;AT Y
+1,X+4;E$;AT Y+5,X+2;E$;AT Y+5,X
+4;E$
135Ø IF (F$="A") THEN PRINT AT Y
+3,X+2;E$;AT Y+3,X+4;E$
136Ø IF F$="J" THEN PRINT AT Y+1
,X+3;"cc";AT Y+2,X+4;"e";AT Y+3,
X+4;"e";AT Y+4,X+2;"58e";AT Y+5,
X+2;"132"
137Ø IF F$="Q" THEN PRINT AT Y+1
,X+2;"4cg";AT Y+2,X+2;"58e";AT Y
+3,X+2;"58e";AT Y+4,X+2;"54e";AT
 Y+5,X+2;"172";AT Y+6,X+3;"12"
138Ø IF F$="K" THEN PRINT AT Y+1
,X+2;"e5e";AT Y+2,X+2;"eh";AT Y+
3,X+2;"he";AT Y+4,X+2;"eh";AT Y+
5,X+2;"e5e"
139Ø RETURN
14ØØ REM SET UPPACK
141Ø LET A$="": LET D$="AØ12Ø23Ø
34Ø45Ø56Ø67Ø78Ø89Ø9A1ØJ11Q12K13"
142Ø PRINT AT 8,9; INK 1; PAPER
5;B$;B$;B$;B$;AT 1Ø,1Ø; FLASH 1;
 PAPER 7; INK 2;"PREPARING PACK"
;AT 12,9; FLASH Ø; PAPER 5; INK
1;B$;B$;B$;B$
143Ø FOR Q=1 TO 39 STEP 3: FOR P
=1 TO 4: LET COL=Ø: IF P=1 OR P=
3 THEN LET COL=2
144Ø LET A$=A$+D$(Q TO Q+2)+B$(P
)+STR$ COL
145Ø NEXT P: NEXT Q
146Ø CLS : PRINT AT 8,9; PAPER 5
; INK 1;B$;B$;B$;B$;AT 1Ø,12; PA
PER 7; FLASH 1;"SHUFFLING";AT 12
,9; PAPER 5; INK 1; FLASH Ø;B$;B
$;B$;B$
147Ø FOR N=1 TO 6Ø: LET A=1+(5*(
1+INT (RND*5Ø))): IF n/2=INT (n/
2) THEN LET A$=A$(A TO A+4)+A$(
TO A-1)+A$(A+5 TO ): BEEP .Ø1,N
148Ø IF n/2<>INT (n/2) THEN LET
A$=A$( TO A-1)+A$(A+5 TO )+A$(A
TO A+4): BEEP .Ø1,N+1Ø
149Ø NEXT N: LET P$=A$: CLS : RE
TURN
15ØØ INPUT "PRESS ENTER TO CONTI
NUE"; LINE Z$: BEEP .Ø5,1Ø: RETU
RN
151Ø REM END GAME
152Ø PAPER 5: INK 1: FOR N=12 TO
 21: PRINT AT N,Ø; PAPER 5;"
                              ": N
EXT N
153Ø IF RES THEN PRINT AT 13,1;"
BAD LUCK: THE CARDS DID NOT ";AT
 14,1;"RUN YOUR WAY": FOR N=-1Ø
TO -3Ø STEP -1: BEEP ABS N/1ØØ,N
: NEXT N
154Ø IF NOT RES THEN PRINT AT 13
,1; FLASH 1;"!!!!! WELL DONE !!!
!!!";AT 14,1; FLASH Ø;"YOUR PATI
ENCE IS REWARDED": FOR N=1 TO 3:
 FOR M=1Ø TO 4Ø STEP 3: BEEP .Ø1
,M: NEXT M: PAUSE 1Ø: NEXT N
155Ø PRINT AT 16,3;"YOU MAY";AT
17,5;"1)PLAY AGAIN";AT 18,5;AT 1
9,5;"2)FINISH PLAYING"
156Ø PAUSE Ø
157Ø IF INKEY$="1" THEN BORDER 4
: PAPER 4: INK Ø: CLS : GO SUB 1
71Ø: GO SUB 171Ø: GO SUB 146Ø: G
O SUB 15ØØ: GO TO 1Ø5Ø
158Ø IF INKEY$="2" THEN CLS : PR
INT AT 1Ø,Ø;"START TAPE TO LOAD
NEXT GAME": LOAD ""
159Ø PAUSE Ø: GO TO 157Ø
16ØØ REM INSTRUCTIONS
161Ø LET T$="         hh88hh88888h88
8h88hhhh8888888888h888h88888h88
8h88h888h8888888888h888h88888h88
8h88h888h8888888888h888h88888h88
8h88hhhh8888888888h888h8hhh8h88
8h88h88888888888888h888h88888h88
8h88h88888888888888h888h888888hh
h888h88888 888"
162Ø BORDER 2: PAPER 3: INK 1: C
LS : PRINT AT 7,Ø; BRIGHT 1;T$:
FOR N=5 TO 15 STEP 1Ø: PRINT AT
N,8; INK Ø; PAPER 6; BRIGHT 1; F
LASH 1;" P A T I E N C E ": NEXT
 N
163Ø PRINT #1;AT Ø,Ø;"FOR INSTRU
CTIONS PRESS ""1""";AT 1,Ø;"OTHE
RWISE ANY KEY": PAUSE Ø: IF INKE
Y$<>"1" THEN RETURN
164Ø CLS : PRINT AT 1,5; INK 6;"
 11-UP PATIENCE: RULES ":PAUSE 1ØØ
```

```
1650 DIM U$(6,30): LET U$(1)="NI
NE CARDS WILL BE DEALT OUT": LET
 U$(2)="YOU MUST COVER EITHER :-
": LET U$(3)="TWO NON PICTURE CA
RDS TOTALING": LET U$(4)="ELEVEN
 (ACE = 1) OR": LET U$(5)="A RUN
 OF J-K-Q ": LET U=5
1660 GO SUB 1690: GO SUB 1500: L
ET U$(1)="IF YOU CAN'T MOVE THEN
 YOU MAY": LET U$(2)="DEAL A SIN
GLE CARD INTO THE": LET U$(3)="C
ENTRE: CARD (9)": LET U$(4)="IF
YOU ARE STILL UNABLE TO": LET U$
(5)= "PLAY THEN YOU HAVE FAILED
AND": LET U$(6)="MUST RESIGN": L
ET U=6
1670 GO SUB 1690: GO SUB 1500
1680 RETURN
1690 FOR N=2 TO 17: PRINT AT N,1
; PAPER 5;"
          ": NEXT N
1700 LET B=1: FOR N=4 TO 3+(U*2)
 STEP 2: FOR M=1 TO 30: PRINT AT
 N,M; PAPER 7; INK 1;"*": PAUSE
2: PRINT AT N,M; PAPER 5;U$(B,M)
: BEEP .01,0: NEXT M: LET B=B+1:
 NEXT N
1710 REM INIT
1720 LET A=1: LET CD=0: LET T=0:
 LET FA=0: LET RES=0
1730 DIM R$(9,5)
1740 LET B$="BDCE"
1750 RETURN
1760 REM GRAPHICS
1770 BORDER 2: CLS : PRINT AT 10
,2;"STOP THE TAPE PLEASE"
1780 RESTORE 1800: FOR N=0 TO 4:
 FOR M=0 TO 7: BORDER M: BEEP .0
1,N

1790 READ A: POKE USR CHR$ (97+N
)+M,A: NEXT M: NEXT N: RUN
1800 DATA 0,94,82,82,82,82,94,0
1810 DATA 0,16,56,124,254,124,56
,16
1820 DATA 0,108,254,254,124,124,
56,16
1830 DATA 16,56,124,124,254,214,
84,16
1840 DATA 0,56,56,16,214,254,214
,16
1850 RUN
9990 SAVE "patienceB" LINE 1760
9992 CLS : PRINT "SWITCH PLUGS A
ND REWIND TO "'"VERIFY.   START
TAPE"
9993 VERIFY "patienceB": CLS : P
RINT "ALL OK"
```

Designs For Living

Colin Christmas takes a further look at computer art.

Still hooked on Graphics? Well don't be afraid to admit it, some of us addicts are often mistaken for respectable members of society, and some of us are regular readers of *ZX Computing*. And while we're on the subject, it's worth a reminder to check back over the past three or four issues of the magazine to see just how much there is to be getting on with for the more enthusiastic programmer who really wants to come to grips with the theoretical and technical aspects of using the graphics and design potential of the micro.

I have great respect and admiration for such enthusiasts. If I wore one, I'd raise my hat to them. I don't, so this vote of thanks will have to do. Other enthusiasts such as myself tend to start about half way through the process. In other words, when most of the hard work has been done and the programs and the hardware have been produced. Lazy? Incompetent? Possibly, but it takes all sorts.

In the last issue I looked at the growing potential of graphics pads generally and of the RD Digital Tracer and Dream Software's CAD package specifically with reference to graphics and design work. However two other, more established "tools" for the graphics design specialist also merit serious consideration.

La plume de ma micro

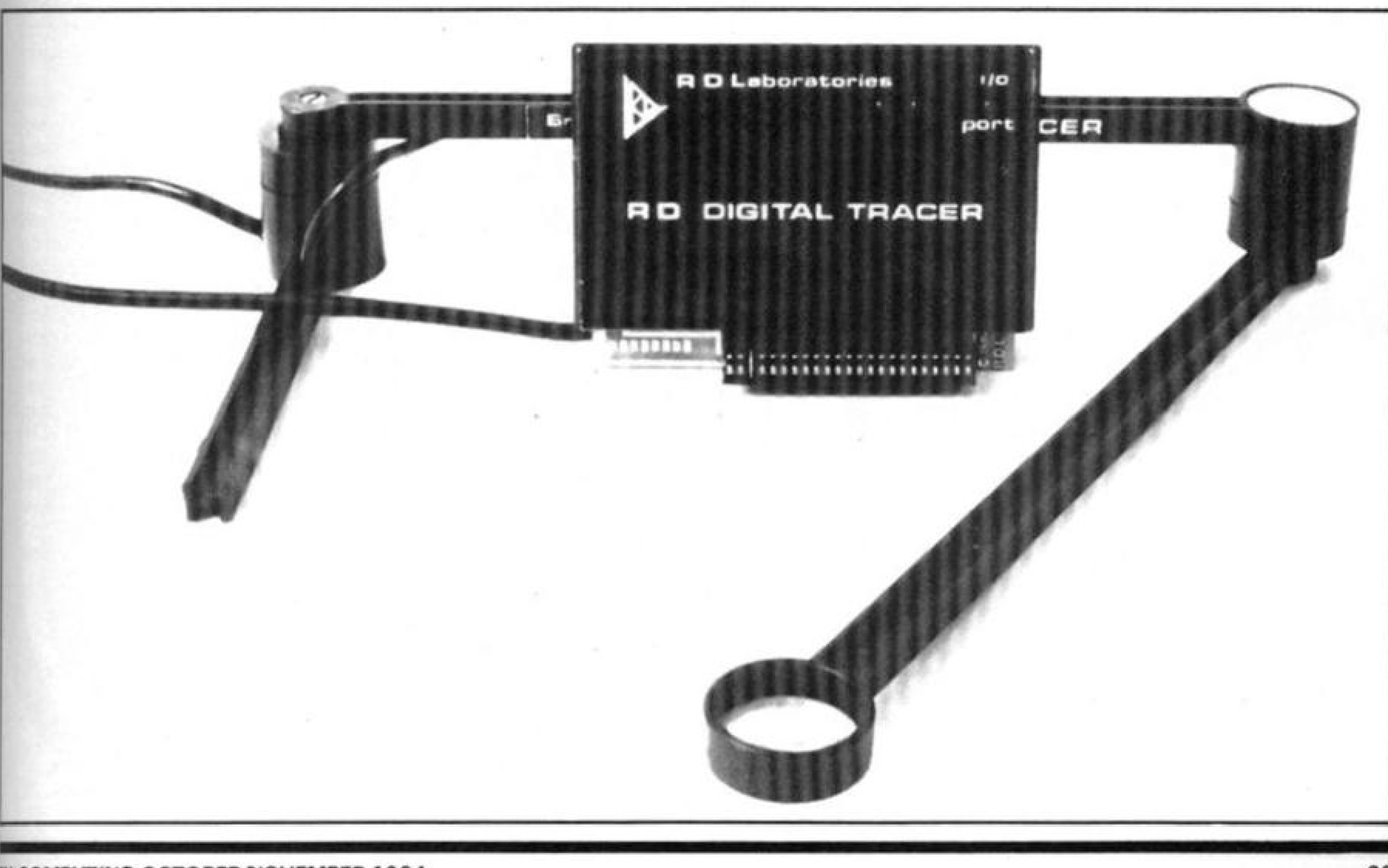
Light pens for use by Micro users have been around for a long time now. Opinions as to their usefulness and value for money vary of course. Recently I've been using the LIGHT PEN produced by DK'TRONICS for the 16 and 48K Spectrum.

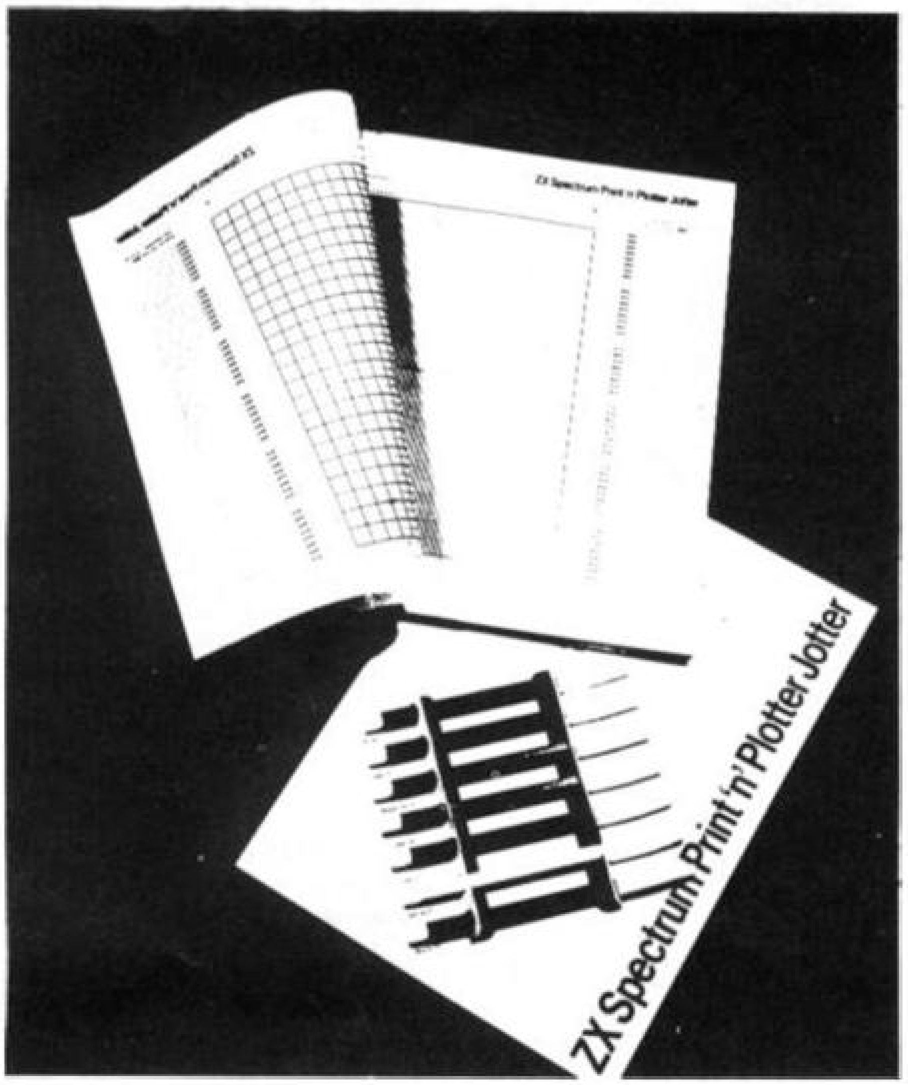
The package consists of a program on cassette, an instruction booklet, the pen itself and a control Interface which is plugged into the back of the computer.

The Interface is compact and well designed and fits neatly and reassuringly into the port. The metre long lead from the pen is fitted with a jackplug which plugs firmly into a socket located on the top of the interface housing. The booklet in fact is one of the best I've seen. It is informative, brief, easy to follow and includes a section at the end on "error conditions" which might be encountered.

The program contains several routines which enable the user to select from sixteen functions. These are displayed as a menu on the bottom two lines of the screen. This means the drawing area is always clear. In order to select a function once the program has been loaded you simply point the pen at the letter or box displayed on the menu and press any key. This is made possible by a machine code routine, one of the several provided.

The program uses two variables called "origin" and "target" which need to be positioned on the screen in order to determine the co-ordiates required for drawing lines, corners of boxes, centres and circumferences of circles, define arcs and so on. The full menu also enables ther user to erase the line, circle, box or whatever has just been drawn, to ink in





shapes, to set border, ink and paper colour, to draw freehand and to clear the screen. Screens can be SAVED or LOADed from tape or can be kept in memory for later recall.

Text can also be inserted into the display. Several of the functions require definite steps which must be followed before the command can be carried out. These are well laid out in the instruction manual. At first it seems as if these separate steps are going to prove tedious and cumbersome but it is surprising how quickly one becomes familiar with them.

Set up

Some people will also find the calibration routine at the beginning of the program annoying. The brightness,contrast and colour controls of the T.V. set they are using may have to be adjusted before the pen can be positioned accurately. I've tried the pen with a Black and White set and this only seems to treble the problems of calibration. I have to confess that I pronounced it's use with Black and White set more nuisance than it was worth.

One last piece of advice, when using a lightpen give some thought to where you position your micro in relation to your screen. Ideally it should go underneath the screen or beside it, for most of us on the left. Remember that your main working area is the screen itself and you need to be able to work there freely and without developing arm strain.

High marks then for one of the most recent lightpens to come onto the market. Something I neglected to say is that it has so far proved to be very reliable. Not so I'm afraid with another lightpen I've been trying to use, the TROJAN.

I've read elsewhere that there were probelms of compatibility with the early TROJAN Lightpens and the newer spectrums. I'm assured that I've got one of the new lightpens. Sorry, Trojan Products, but mine has been giving me grey hairs just where they are not welcome — in amongst the few I've already got. The most common problem being that the program seems to jump between commands or to stick in commands. At best erratic and unreliable, at worst, it seems to crash.

The software solution

A Utility which has also been with us fo a while now but which is still capable of straining the imagination is PAINTBOX from PRINT 'N' PLOTTER PRODUCTS. Again, it's now only one of the many Graphics packages available from the Spectrum but it's certainly worth serious consideration nevertheless.

It claims to be "ingenious", "unique", "the most imaginative." In the cold light of the monitor screen may I offer Impressive and Comprehensive as more critical alternatives?

This graphics programming tool-kit for the 48K Spectrum consists of a cassette containing two programs, one on each side. One to demonstrate some of the results which can be achieved. The other with the machine code program which enables you to do all the work. There is also a twenty eight page book to take you through this supermarket of graphics 'deals', It contains a lot of detail and the print is small.

Working through it is not easy but it is written well and conveys real excitement and enthusiasm for the tasks involved. In the end it's a smooth ride and it gets easier to use.

The main menu, as you would expect, is displayed once the program is loaded. Before you move on you have a choice of cursor control, keyboard or Kempston Joystick, although other Joysticks may be used. If you then choose Menu 1 — most Games enthusiasts do, you can explore the UDG Editor.

Without affecting the normal character set you can program up to 84 user definable characters and locate this set into your own written programs. This is made possible by storing 4 Banks of characters in memory and recalling them at any time into the usual UDG area by a built in short machine code routine. There is of course a facility of both saving all four banks to tape and loading prerecorded banks.

Sketch Pad, next off the main menu, puts on the screen a small 'try out' area for related characters before they are used in screen graphics or programs. The current UDG file appears at the top of the screen.

Food for thought

As you continue to work through the Menu like some gourmet in a great restaurant, you discover how to define any or all of the 84 charactrs available and put them in position, then put them into your own programs.

High resolution screen graphic work can be attempted using the Precision Plotter section of the program. The format will be familiar. Plot, draw, fill, erase, circle, radials and arc, together with choice of ink, cursor and with some difficulty paper colour. The cursor moves smoothly and quite quickly as you work. However, sometimes it is useful to be able to move the cursor with great precision and accuracy. This also is possible by keeping the SHIFT key pressed during movement. I was very impressed with the action and ease with which one could work with this section.

Moving on quickly, the rest of the program offers a Screen Planner where your graphics produced using Precision Plotter can be combined with the UDG's you defined and stored in any or all of the four UDG Banks. Procedures are given for achieving Multiple Screen Files. A short machine code routine, used as a memory file, when called transfers data to the screen as a picture. This data call can be held permanently above RAMTOP and called at any time.

Impressive and comprehensive, it is a fairly powerful Graphics aid, above all, it is fun to use and experiment with. The more you use it, the bolder and more adventurous you become.

State of the art

It is usual to talk of exploring the potential of our micros when discussing the hardware and software available for say Graphics and Design. It seems to me that together they offer a challenge to us, the users, to explore our own potential to make, create and design.

A challenge not our powers of logical thinking or convergent thinking, but to our powers of divergent thinking. As users it's up to us to take up the challenge. What can we achieve, making use of lightpens, tracers, graphics tool-kits and so on?

It's difficult trying to imagine a young Leonardo da Vinci sitting down with paper, canvas, pens, inks, brushes and paints sucking his thumb and wondering, "Well what do they expect me to do with this lot?" There may not be many Leonardos amongst us, but the challenge remains, What CAN we do with this lot?

And I don't just mean Games........

DK'Tronics,
Unit 2,
Shire Hill Industrial Estate,
Saffron Walden,
Essex CB11 3AX.

Print 'n' Plotter Products,
19, Borough High Street,
London SE1 9SE.

PRISM competition

This is your chance to win a super PRISM Movit!!

Yes! This issue's competition gives you the opportunity to win one of the excellent robots from the PRISM Movit range! We have ten Movits to give away, and all you need to give yourself a sporting chance of winning is a keen eye!

Cast your gaze upon the curious-looking pictures numbered 1-5. Do they look familier? Can you identify them? If you think you can, write down what each object is next to the corresponding number on the coupon supplied. To enter the competition, pop the coupon into an envelope, and send it to:

PRISM Competition,
ZX Computing,
ASP Ltd,
1, Golden Square,
London W1R 3AB.

Please ensure that the envelope is marked PRISM competition, else your entry may not be accepted! (shame!) Also, be sure to indicate on the coupon your order of preference, as we have two models of each Movit to give away.

Prism's Movits

Prism Microproducts Limited (to give their full name) who have generously donated this issue's prizes, are probably best known as distributors of the Spectrum. However, PRISM is also a robotics company, hence the Movits range. Prism production and developments manager, Stuart Barnard, outlined the history of the Movit in a recent interview. As he explained: "They (Movits) had been available in Japan for some years, which meant that we were looking at a product which has been completely test-marketed and proved before we had even started. When we first began to look at Movits, there were twenty-one products in the range. But, during the period in which we were formulating our marketing arrangements with the Japanese manufacturer, the Movit range had been reduced to six which were suitable for the British market, *and* which gave a full selection of movements and sensory systems.

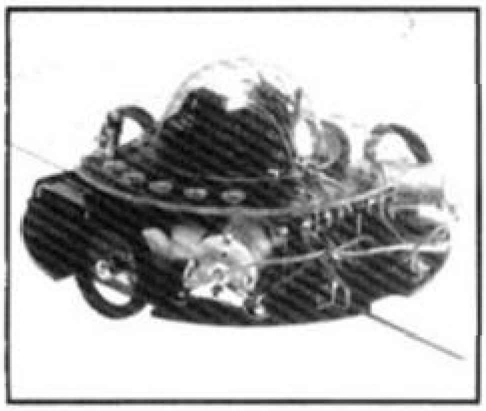
"With the remaining six Movits, we did extensive field trials and eventually decided that one of the six we originally chose could cause too many problems, as it has a very delicate leg-mechanism. This was quite sad because it (a Movit called the Avoider) was potentially the biggest seller, but we decided to drop it from the range."

Once the decision had been made on which robots were to comprise the range, the next problem was finding the right market-place for them as Stuart explained. — "They're not really toy's although the toy market is very interested in them, and they are so different that they don't really fit into the computer market-place."

Despite such difficulties, Movits have been selling well. "When we first decided to test the market with a little advertising "continued Stuart" we shipped two-hundred Movits from Japan which would cover the demand, or so we thought! However, from that first advertisement we had over six-hundred advance order's. That first two-hunJred went within ten days!"

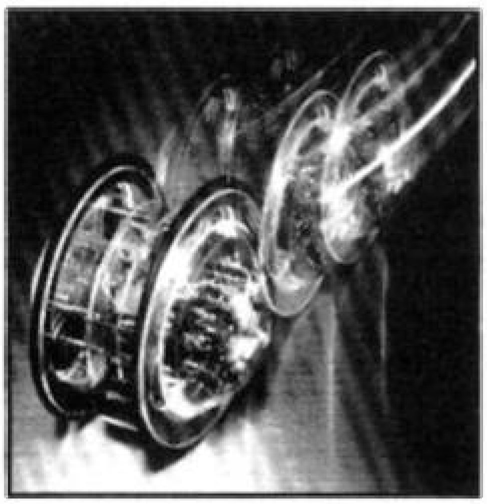
Did PRISM intend to expand the range to include some of the Movits which were not originally chosen for the British market? Mike Richardson, PRISM's PR executive had this to say — "Prism, at the moment, have only taken those five. But, if people go for them as we anticipate, there's obviously going to be a demand. Once someone's got five of them, or whatever, they're going to say 'Well, what else have they got?'. So obviously we would like to bring in more!"

Finally, I asked Mike about his own experiences with Movit's. Does he build the kits? — "Well, the thing is with Movits is that they are so addic-



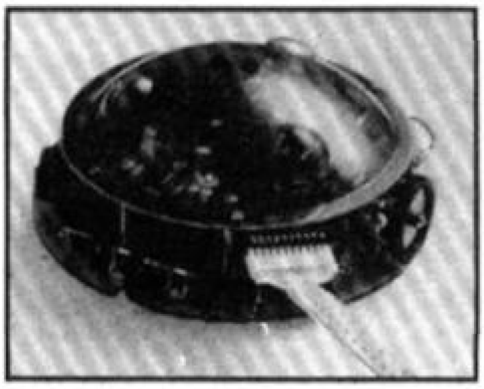
Line Tracer II £17.99

The Line Tracer II has 3 wheels driven by 2 DC motors. Control is via an infra-red transmitter/receiver.



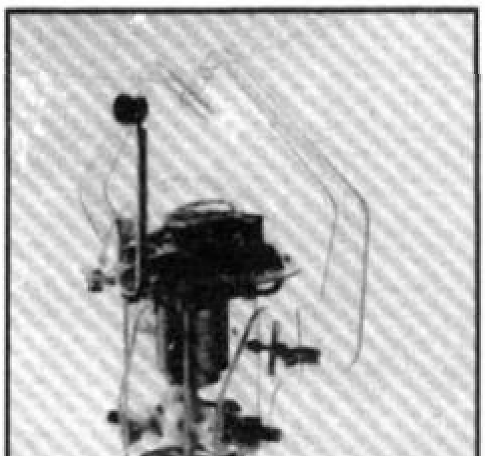
Piper Mouse £19.99

The Piper Mouse has 3 wheels driven by 2 DC motors, and is controlled via an ultrasonic transmitter/receiver.



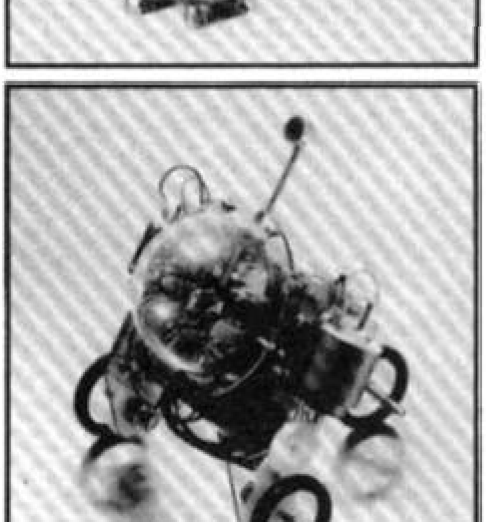
Memocon Crawler £34.99

The Memocon Crawler has 3 wheels driven by 2 DC motors. It's motion is under program control and is programmed via a detachable keyboard.



Monkey £9.99

The Monkey moves 'tightrope fashion' along a guiding cord. Motion is via two, alternately-moving gripper arms driven by a crank, and is controlled by sounds falling within the audible range ie whistling, clapping etc.



Circular £29.99

The Circular has 2 wheels driven by 2 DC motors, and is controlled via a hand-held remote controller.

tive. I take them home and think 'Oh well, this won't take long', and you get the construction-plan – which is superb – but you find it's a little bit daunting to start with. But when you start to build the thing you get well and truly hooked. You find that instead of taking an hour, you spend four hours putting the thing together and it's like a really good book – you can't put the thing down and before you know it it's four o'clock in the morning and you've **still** got to get up for work!''

So, if **you'd** like a Movit, fill in the coupon and enter our competition – **NOW!**

The Rules

• The competition is open to all UK and Northern Ireland readers of *ZX Computing*, except employees of Argus Specialist Publications Ltd. Their printers and distributors, employees of Prism Microproducts Ltd, or anyone associated with the competition.

• As long as the correct coupon is used there is no limit to the number of entries from each individual.

• All entries must be postmarked before November 30th 1984. The prizes will be awarded to the first ten entries picked at random which bear the correct answers, the decision to be made by the Editor of *ZX Computing*. No correspondence will be entered into with regard to the results and it is a condition of entry that the Editor's decision is accepted as final.

• The winners will be notified by post and the results will be published in a future issue of *ZX Computing*.

'Jumbogram' Competition Results

There was a moderate response to the June/July 'Jumbogram' competition, which is not in the least bit suprising because it was very tough! However, the forty lucky winners were:

Adrian Everett of Plymouth.
David Clifford of Cheltenham.
Herwig Timm of West Germany.
Peter Glen from Ashby-de-la Zouch.
B J Kamphuis of The Netherlands.
Mr. K R Foot in Surrey.
Stuart Ferris of Kilmarnock.
Richard Oive in Exmouth.
Mr D Jones from Bekhill, East Sussex.
Paul Waugh in Coventry.
Mr J Moran from Carterton in Oxon.
Mr B E Thomas in Bromley, Kent.
Carol Powles of Merthyr Tydfil, Mid Glamorgan.
R A Mellor from Walsall, West Midlands.
James Phoenix of Middlesborough.
P R Shears of Rolleston in Leicestershire.
J D Kidd of Clacton in Essex.
David Lawley of West Bromwich.
Mr N Symes of London.
Philip Andrews of London.
Mr A Landan of London.
Christopher Pearson of Carlisle in Cumbria.
Mick Wilford of Charing in Kent.
Robert Hugh Roger of Kilmarnock.
Jamie Seymour of Leeds.
Colin E Piggot of Leeds.
N F Owen of Missenden, Bucks.
Shai Kedem of Israel.
Keven Denness of Bideford in Devon.
K M Walsh of Alnwich in Northern Ireland.
Ben Jackson of St Leonards-on-Sea.
Ian Jay of Bristol.
Ian Hilton of Crawley, West Sussex.
Tony Buckley of County Durham.
K R Foot of Chessington in Surrey.
J K Marston of Wimborne in Dorset.
Andrew Thomas of Downened in Bristol.
R A Barnaby of Sale in Cheshire.
and Andrew Broome of Dollington in Cheshire.

Many thanks to all of you who entered the competition. It was a tough'en – nothing like this issue's PRISM comp., so be sure to enter!!

Write a Pun

The *ZX Computing* 'write a pun' competition prompted one extraordinary entry which, though I am ashamed to admit it, had me baffled. This being so, I invited reader's to enlighten me upon the meaning of the following pun, submitted by John Stuart:

GOSUB AND THEN ARRAY STEP INK SCROLL OR dREM CODE – DIM PIce & RAND NEW LOAD RED OR.

Three people wrote in with the answer. One of the three was Jeremy Snelling from Thundersley in Essex. He wrote:

Dear *ZX Computing*,
I believe that I can INPUT a suggestion as to the translation of John Stuart's ENTER IN the 'write a pun' competition. I have SIN this usical beFOR. It is very entertaining and I was stuck to my seat IN the CIRCLE as soon as the curtains were DRAWn and would not *(you missed one there, Jeremy – Ed.)* LET myself leave until the INterval 'COS it was so SPECtrum AT ULAr. I can't wait to see it again the NEXT time. The name of the musical? 'Joseph And His Amazing Technicolour Dreamcoat' by Tim Rice and Andrew Lloyd Weber *of course!*

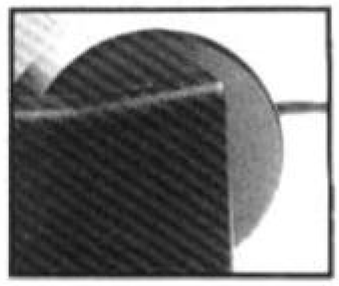
Thank your Jeremy. I knew it all along of course. Thank you also Mrs. J. M. Benson of Broughton-in-Furness in Cumbria *(ah, Cumbria!)* who also supplied the true meaning, as did Richard Danby from Quarndon in Derby, who says "It wouldn't have been half as interesting if all he had come up with was CAT$!" Laugh? I thought – well you know what I thought! Each of you should have received something nice by the time you read this.

To sign off for this issue, could I just suggest that you all enter our Prism competition. The Movits are excellent, so get out your specs, examine the pic's, and **WRITE!**
Jamie Clary.

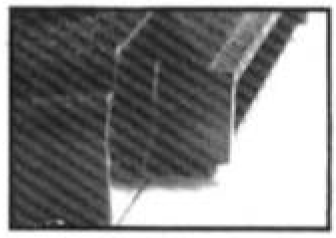
1



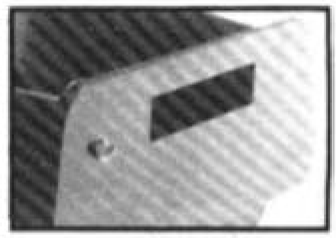
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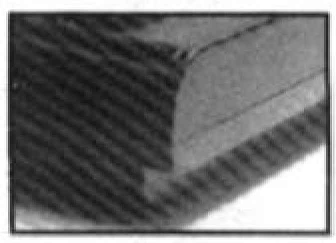
3



4



5



NAME . . . .

ADDRESS . . . .

. . . .

. . . .

"I think that the objects in the *ZX Computing* PRISM Competition are:

1) . . . .

2) . . . .

3) . . . .

4) . . . .

5) . . . .

"My PRISM Movit order of preference is:
(Please number each of the following with a rating from 1 to 5).

☐ Line Tracer II

☐ Piper Mouse

☐ Memocon Crawler

☐ Monkey

☐ Circular

Met. Plot

An unusual and impressive way of using the ZX81 and printer from Henley on Thames inhabitant, David Lockyer.

Although this program will need a lot of care to enter it and get it working, it will be time well spent. I have never seen the ZX81/printer used to such an impressive degree. Without further adieu I'll hand you over to David:

Popular magazines for users of home computers often devote page after page to games programs and there is clearly a large market for such software and hardware. I believe that many a home-computer buff, having mastered the rudiments of his chosen machine, soon finds difficulty in making use of it; he ends up, not by computing at all, but by playing 'Space-Invaders' and the like.

One way to avoid this fate is to combine computing with some other hobby and so heighten the enjoyment gained from both interests. For instance, last year I attended a course of lectures on meteorology and found it very instructional to prepare weather forecast charts from the daily broadcasts to shipping made by the BBC. So, when I added a ZX-printer to my 16K ZX81 a few months ago, I set about writing a program that would print a simple weather chart, and plot on it barometric pressures, wind strength and wind directions to allow me to add isobars with a ball-point pen. The result is the program that follows.

You will need patience and perseverance to enter the program, and several cassettes of tape, for it is important to SAVE the program at frequent intervals in case of the dreaded ZX-81 crash, the unintentional use of RUN or CLEAR, or just the pressing need to do something else!

Figure 1a shows a print of the graphics that we are hoping to produce, with pressure data, wind strengths and direction arrows plotted. The names of the Coastal Stations and Sea Areas, together with the co-ordinates needed to plot digits and arrows in the relevant positions, are stored in a string array C$(445). Similarly, the code that describes ech arrow is held in array D$(72). These arrays have to be set up before entering the main program.

First of all, enter as a direct command,

POKE 16389,124

followed by,

NEW

to reserve space above RAMTOP for use later by the main program. Now enter Program 1 and RUN it. (This should be your last use of RUN, unless you wish to start all over again!) It will dimension the arrays and let you enter the name of each Coastal Station or Sea Area followed by the three pairs of numbers exactly as listed in Table 1. Once this has been done the program will continue, displaying the data now stored in C$(445). The next part of the program will enter data into D$(72); you must enter all the 72 numbers shown in Table 2, reading from left to right. Again, the data entered will be displayed for checking.

When you are sure that the contents of both arrays are correct delete Program 1 except for line 1 which must always be there in its now changed form, line by line, and enter Program 2, which is based on the plotting program given in the ZX-printer manual, modified to allow you to 'draw' on the notional 256 × 256 grid held in array A$(32,256). The plot position can be moved laterally, vertically or diagonally about the grid using keys "1" to "8". With keys "1" to "4" movement is diagonally in the direction of the black square in the graphics symbol shown on the key; keys "5" to "8" move the plot in the direction of the arrow marked on each. I suggest that a little experimentation would be useful at this stage; again, do not use RUN but GOTO 100. Draw a few lines, preferbly following a plan, to make sure that the program is plotting correctly in all directions. BREAK out of the program and examine your handiwork by using GOTO 9988. If

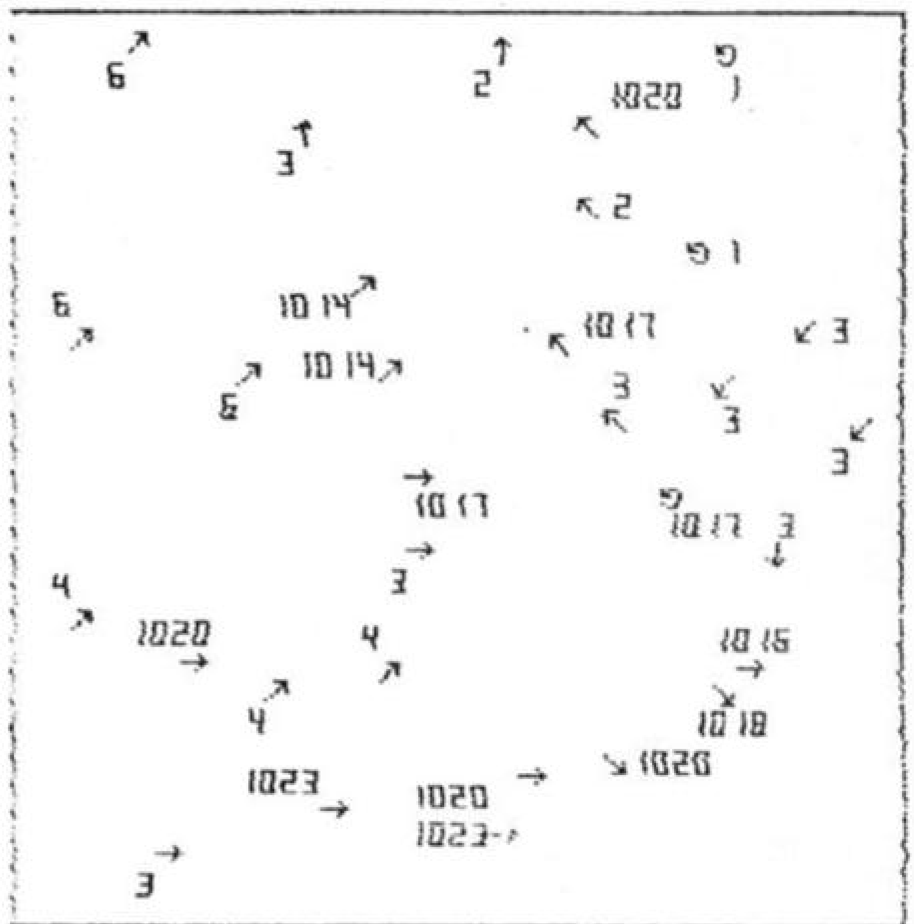


Fig. 1a Graphics which vary with the data entered

Program 1

```
   1 REM PROGRAM 1-THIS REM IS
ESSENTIAL
   2 POKE 16514,58
   3 POKE 16515,142
   4 POKE 16516,64
   5 POKE 16517,95
   6 POKE 16518,58
   7 POKE 16519,143
   8 POKE 16520,64
   9 POKE 16521,179
  10 POKE 16522,6
  11 POKE 16523,0
  12 POKE 16524,79
  13 POKE 16525,201
  14 POKE 16526,240
  15 POKE 16527,128
  20 DIM A$(3,256)
  25 DIM C$(445)
  30 DIM D$(32)
  40 DIM V(6)
  45 LET NFB=1
  48 FOR I=1 TO 31
```

```
  50 PRINT AT 0,0;" INPUT STATIO
N NAME"
  60 INPUT L$
  70 CLS
  80 LET C$(NFB)=CHR$ LEN L$
  90 LET C$(NFB+1 TO NFB+LEN L$)
=L$
 100 LET NFB=NFB+LEN L$+1
 110 FOR M=1 TO 6
 120 INPUT N
 130 LET C$(NFB)=CHR$ N
 140 LET NFB=NFB+1
 150 NEXT M
 160 NEXT I
 200 REM PROGRAM TO PRINT C$(445
)
 205 LET P=1
 210 LET L$=C$(P+1 TO P+CODE C$(
P))
 220 PRINT L$
 230 LET P=P+1+CODE C$(P)
 240 FOR N=1 TO 6
 250 LET V(N)=CODE C$(P)
 260 LET P=P+1
 270 NEXT N
 280 PRINT TAB 6;V(1);" ";V(2);T
AB 16;V(3);" ";V(4);TAB 26;V(5);
" ";V(6)
 290 NEXT M
 295 PAUSE 200
 300 REM PROGRAM TO LOAD D$(72)
 305 CLS
 308 PRINT "ENTER NUMBERS FROM T
ABLE 2"
 310 FOR M=1 TO 72
 320 INPUT N
 330 PRINT AT 0,0;"NO. OF VALUES
 ENTERED INTO D$";" = ";M
 340 LET D$(M)=CHR$ N
 350 NEXT M
 400 REM PROGRAM TO PRINT D$
 410 LET P=1
 420 FOR N=1 TO 29 STEP 4
 430 PRINT TAB N;CODE D$(P);
 440 LET P=P+1
 450 NEXT N
 460 PRINT TAB 1;" "
 470 GOTO 420
```

you experiment in this way, be careful to enter as a direct command,

DIM A$(32,256)

to reset all elements of the array to zero.

Next, draw a large 256 × 256 grid of squares, or better, acquire some graph-paper, and divide the top axis by 8 to produce a grid of 32 × 256 divisions, corresponding to the elements of the A$(32,256) array. Label the large divisions 1 to 32 across the grid, from left to right, and the small divsions 1 to 256 from top to bottom. You must now mark on the grid the areas defined by the co-ordinates held in C$(445) and listed for each station as DC,DR in Table 1. For stations from Tiree to Jersey inclusive, mark out a rectangle, 3 large divisions across and 7 small divisions down, so that the area defined by DC,DR is in the top left-hand corner. For the remaining stations, 2 large divisions across and 7 small divisions down are required. In the same way, mark the positions of the wind direction arrows using co-ordinates NX,NY also given in Table 1, but this time produce a square, 1 large division across and 8 small divisions down.

Figure 2 shows how your grid should look for a small area around the Scilly Isles; ignore for the moment the graphics — they will be discussed later. The grid is shown marked for Scilly, Fastnet and Lundy, and partly for Channel Light Vessel and Jersey.

Landmasses

Once all the areas have been plotted on the grid, use your artistic talents to copy, as nearly as you can, the outlines of all the land masses shown in Figure 1b avoiding completely these 'total exclusion zones'. Use a soft pencil and, when the outlines are to your satisfaction, go round them carefully, marking with ink a cross in the squares to be plotted. After that, you can rub out the pencil lines.

Now you must adjust your thinking and re-label the grid from 0 to 255 across the top (X-axis), and from 255 to 0 from top to bottom, down one side (Y-axis). For each land mass choose a convenient starting point and mark it with its X and Y co-ordinates. Use Program 2

Contents of array C$ (445)

	DX,DY	NX,NY	DC,DR
TIREE	74 176	13 74	10 60
SUMBURGH	169 236	21 26	22 20
BELL-ROCK	161 171	20 90	21 65
DOWSING	166 117	24 131	24 139
GOEREE	201 84	27 180	26 172
VARNE	194 61	26 187	25 195
ROYAL SOVEREIGN	177 50	22 206	23 206
CHANNEL LV	113 40	19 210	15 216
SCILLY	65 44	12 220	9 212
VALENTINA	34 85	7 179	5 171
RONALDSWAY	113 122	15 126	15 134
MALIN HEAD	81 160	14 97	11 96
JERSEY	113 29	18 227	15 227
VIKING	204 238	26 9	26 18
FORTIES	204 192	25 64	26 64
CROMARTY	172 205	21 51	22 51
TYNE	172 155	22 110	22 101
DOGGER	204 146	26 101	26 110
FISHER	236 170	29 86	30 85
GERMAN BIGHT	236 135	31 112	30 121
HUMBER	220 117	28 147	26 139
SOLE	36 14	6 233	5 242
LUNDY	100 84	14 181	13 172
FASTNET	68 61	10 186	9 195
IRISH SEA	108 100	15 147	14 156
SHANNON	12 98	3 167	2 158
ROCKALL	12 176	3 89	2 80
MALIN	60 149	9 98	8 107
HEBRIDES	76 217	11 30	10 39
BAILEY	28 241	5 6	4 15
FAIR ISLE	132 239	18 8	17 17

Table 1

Contents of array D$ (72)

0	32	64	255	64	32	0	0
16	56	84	16	16	16	16	16
0	4	2	255	2	4	0	0
16	16	16	16	16	84	56	16
0	30	6	10	18	32	64	0
0	120	96	80	72	4	2	0
0	2	4	72	80	96	120	0
0	64	32	18	10	6	30	0
0	92	98	114	2	34	28	0

Table 2

Program 2

```
   1 REM THIS LINE HOLDS M-CODE
FROM PROG 1.
   2 SAVE "METPLOT"
   3 FAST
  20 IF PEEK 16388+256*PEEK 1638
9=31744 THEN GOTO 28
  23 PRINT "MEMORY NOT RESERVED.
 IT WILL NOWBE RESERVED FOR YOU.
 JUST RELOAD AFTER A SHORT PAUSE
"
  24 PAUSE 1000
  25 POKE 16389,124
  27 NEW
  28 FAST
  29 FOR I=0 TO 112
  30 POKE 31744+I,PEEK (2161+I)
  31 NEXT I
  32 POKE 31800,63
  33 POKE 31857,201
  36 SLOW
 100 PRINT "ENTER START CO-ORDIN
ATES"
 120 INPUT X
 130 INPUT Y
 140 GOSUB 9980
 145 SLOW
 150 PRINT AT 0,0;" CO-ORDINATES
  OF  LAST  POINT   PLOTTED"
 160 PRINT AT 2,10;"X=";X;"   Y="
;Y;"   "
 170 LET I$=INKEY$
 180 IF I$="" THEN GOTO 170
 190 LET Y=Y-(I$="3")-(I$="6")-(
I$="4")+(I$="1")+(I$="7")+(I$="2
")
 200 LET X=X-(I$="1")-(I$="5")-(
I$="4")+(I$="2")+(I$="8")+(I$="3
")
 210 GOTO 140
9970 REM PLOTS(X,Y) INTO A$
9980 FAST
9981 IF X<0 OR X>255 OR Y<0 OR Y
>255 THEN RETURN
9982 LET C=1+INT (X/8)
9983 LET R=256-INT Y
9984 POKE 16526,CODE A$(C,R)
9985 POKE 16527,2**(8*C-INT X-1)

9986 LET A$(C,R)=CHR$ (USR 16514
)
9987 RETURN
9988 FOR I=0 TO 256 STEP 8
9989 FOR J=1 TO 32
9990 FOR K=1 TO 8
9991 POKE 32255+K+8*(J-1),CODE A
$(J,K+I)
9992 NEXT K
9993 NEXT J
9994 FOR H=0 TO 31
9995 POKE 16444+H,H
9996 NEXT H
9997 LET HPRINT=USR 31744
9998 NEXT I
```



Fig. 1b The outlines of the map (note the marking of some stations with a '+')

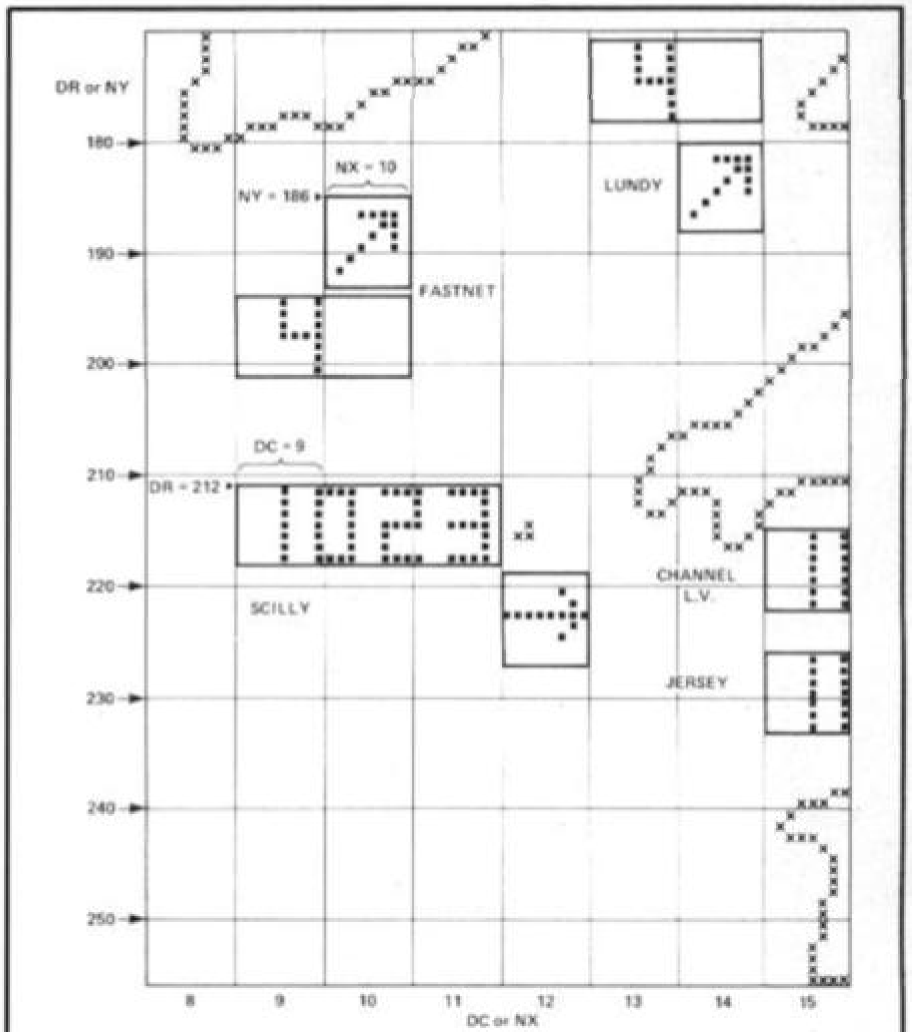


Fig. 2a How to mark out the areas of the grid to be avoided when drawing the map

(GOTO 100) to enter these co-ordinates and then work carefully around the outlines, from one cross to the next, using keys "1" to "8" as required to enter each point. I suggest that you SAVE (GOTO 2) and print (GOTO 9988) frequently from now on, and certainly after completing each major land mass. For the islands you should, of course, finish where you started, with the correct co-ordinates displayed on the screen. If you do not, don't panic! It is possible, with a little artistry, to finish at the right point without the error being obvious in the printed map. Also, the odd 'dot' in the wrong place can often be removed by the careful use of the direct command,

LET A$(m,n) = CHR$ O

where m and n are the relevant co-ordinates. If there are more than a few errors it is probably better to remove everything with NEW, reload with your most recent copy from tape, and start again from where that left off.

When all the outlines have been entered add Program 3 and run it using GOTO 8215 to produce a border around the map. Your print should now look like Figure 1b, with gaps in the French coastline as shown.

The rest is easy! Amend the program so far entered by deleting unwanted lines and adding new lines to produce Program 4. SAVE this definitive version using GOTO 2.

It may be of interest to readers to examine in a little more detail the routines used to plot the graphics. The numbers

Program 3

```
8212 REM DRAWS BORDERS
8215 FAST
8220 LET Y=255
8230 FOR X=0 TO 255
8240 GOSUB 9980
8250 NEXT X
8260 LET X=255
8270 FOR Y=0 TO 255
8280 GOSUB 9980
8290 NEXT Y
8300 LET Y=0
8310 FOR X=0 TO 255
8320 GOSUB 9980
8330 NEXT X
8340 LET X=0
8350 FOR Y=0 TO 255
8360 GOSUB 9980
8370 NEXT Y
8380 STOP
```

Program 4

```
   1 REM THIS LINE HOLDS M-CODE
FROM PROG 1.
   2 SAVE "METPLOT"
   3 FAST
   6 LET B=9970
   7 LET F=3
   8 LET A=2000
  10 LET FL=0
  20 IF PEEK 16388+256*PEEK 1638
9=31744 THEN GOTO 28
  23 PRINT "MEMORY NOT RESERVED.
 IT WILL NOWBE RESERVED FOR YOU.
 JUST RELOAD AFTER A SHORT PAUSE
"
  24 PAUSE 1000
  25 POKE 16389,124
  27 NEW
  28 FAST
  29 FOR I=0 TO 112
  30 POKE 31744+I,PEEK (2161+I)
  31 NEXT I
  32 POKE 31800,63
  33 POKE 31857,201
  36 SLOW
  37 PRINT "THIS  PROGRAM  TAKES
 BAROMETRICPRESSURES,WIND DIREC
TIONS  AND  FORCES GIVEN IN THE
BBC  WEATHERREPORTS   FOR  COSTA
L  STATIONS AND SEA AREAS  AND P
RINTS  THEM ON A MAP OF THE UK."

  38 PRINT
  39 PRINT "PRESS ANY KEY TO STA
RT"
  40 PRINT
  41 PRINT "THEREAFTER ENTER ""A
""  TO STOP AT ANY TIME"
  42 PRINT
  43 PRINT "NEVER  ENTER "" RUN
""OR "" CLEAR ""OR YOU WILL  LOS
E THE MAP  AND  HAVE TO LOAD AGA
IN"

  44 PAUSE 50000
  45 CLS
  46 LPRINT
  47 PRINT "ENTER PRESSURES AS M
ILLIBARS         (WHOLE NUMBERS) E
.G. 1032",,,
  48 LPRINT "ENTER PRESSURES AS
MILLIBARS         (WHOLE NUMBERS)
E.G. 1032",,,
  49 PRINT "ENTER WIND DIRECTION
 TO NEAREST 1/8 TH. IE. N,NE,E,S
E,S,SW,W,NW OR ""VAR"" FOR A VAR
IABLE WIND  OR FOR CALM",,,,
  50 LPRINT "ENTER WIND DIRECTIO
N TO NEAREST 1/8 TH. IE. N,NE,E,
SE,S,SW,W,NW OR ""VAR"" FOR A VA
RIABLE WIND  OR FOR CALM",,,,
  51 PRINT "ENTER WIND FORCE AS
A DIGIT 1 TO12 OF BEAUFORT SCALE
 - USE 0 FORCALM."
  53 LPRINT "ENTER WIND FORCE AS
 A DIGIT 1 TO12 OF BEAUFORT SCAL
E - USE 0 FORCALM."
  55 PRINT "OR IF YOU PREFER ENT
ER FORCE IN KNOTS OR MPH. (WHOLE
 NUMBERS)",,,
  57 LPRINT "OR IF YOU PREFER EN
TER FORCE IN KNOTS OR MPH. (WHOL
E NUMBERS)",,,
  60 PRINT "NOW ENTER MONTH, EG.
 - SEPT"," "
  62 INPUT M$
  64 IF M$="A" THEN STOP
```

```
  66 PRINT "THEN ENTER DAY (NUMB
ER)",,,
  68 INPUT D
  70 PRINT "AND TIME, EG - 1800"

  72 INPUT T
  74 PRINT
  76 PRINT "AND THE YEAR"
  78 INPUT Y$
  80 IF Y$="A" THEN STOP
  81 CLS
  82 PRINT "DO YO WISH TO HAVE A
 LIST OF THEDATA THAT YOU ARE EN
TERING?",,,"( ANSWER  Y OR N )"
  84 INPUT N$
  85 CLS
  86 IF N$="Y" THEN LET FL=1
  88 IF N$="A" THEN STOP
  89 IF FL=0 THEN GOTO 95
  92 LPRINT "STATION/",,"SEA ARE
A"
  94 LPRINT
  95 LET SUM=0
  97 LET P=1
 100 LET N=0
 110 LET SUM=SUM+1
1310 LET L$=C$(P+1 TO P+CODE C$(
P))
1320 LET P=P+1+CODE C$(P)
1330 FOR M=1 TO 6
1340 LET V(M)=CODE C$(P)
1350 LET P=P+1
1360 NEXT M
1370 LET DX=V(1)
1380 LET DY=V(2)
1390 LET NX=V(3)
1400 LET NY=V(4)
1410 LET DC=V(5)
1420 LET DR=V(6)
2000 CLS
2001 IF SUM>13 THEN GOTO 2060

2002 PRINT AT 0,4;"ENTER PRESSUR
E FOR :-"
2004 PRINT AT 2,4;L$
2005 INPUT N$
2006 IF N$="A" THEN STOP
2007 GOSUB F*A
2008 FOR I=0 TO (LEN N$-1)*6 STE
P 6
2010 LET N=N+1
2020 LET DX=DX+I
2030 LET V$=N$(N)
2040 GOSUB 3000
2045 LET DX=DX-I
2050 NEXT I
2055 IF SUM>13 THEN RETURN
2060 PRINT AT 0,4;"ENTER WIND DI
RECTION FOR :-"
2064 PRINT AT 2,4;L$
2065 INPUT W$
2068 IF W$="A" THEN STOP
2070 CLS
2080 GOSUB 7000
2082 IF FL=0 THEN GOTO 2090
2083 LPRINT
2085 LPRINT L$;TAB 19;N$;TAB 29;
W$
2090 IF SUM=31 THEN GOTO 2600
2100 IF SUM=13 THEN GOTO 2700
2500 GOTO 100
2600 CLS
2602 PRINT "ALL DATA  SHOULD NOW
  HAVE BEEN ENTERED.",,,,"TO PRI
NT THE MAP ENTER ""P"",",,"TO RES
TART THE PROGRAM ENTER ""R""OR E
NTER ""A"" TO STOP"
2605 INPUT N$
2607 CLS
2610 IF N$="P" THEN GOTO 9950
2620 IF N$="R" THEN GOTO 3
2630 IF N$="A" THEN STOP
2640 GOTO 2602
2700 PRINT "DATA  FOR COASTAL  S
TATIONS HAVENOW  HAVE BEEN ENTER
ED.",,,"IF YOU WISH TO PRINT THE
 MAP    ENTER ""P"",",,"TO CONTI
NUE ENTERING SEA AREA   DATA ENT
ER ""C"" OR ENTER ""A"" TO  STOP
"
2705 INPUT N$
2710 LPRINT
2720 IF N$="P" THEN GOTO 9950
2730 IF N$="C" THEN GOTO 100
2740 IF N$="A" THEN STOP
2750 GOTO 2705
3000 IF V$<>"5" AND V$<>"6" THEN
 GOSUB 5100
3010 IF V$<>"2" THEN GOSUB 5200
3020 IF V$<>"1" AND V$<>"4" THEN
 GOSUB 5300
3030 IF V$="2" OR V$="6" OR V$="
8" OR V$="0" THEN GOSUB 5400
3040 IF V$<>"1" AND V$<>"4" AND
V$<>"7" THEN GOSUB 5500
3050 IF V$<>"1" AND V$<>"7" AND
V$<>"0" THEN GOSUB 5600
3060 IF V$<>"1" AND V$<>"2" AND
V$<>"3" AND V$<>"7" THEN GOSUB 5
700
3070 RETURN
5100 LET X=DX+F
5110 FOR Y=DY-F TO DY
5120 GOSUB B
5130 NEXT Y
5140 RETURN
5200 LET X=DX+F
5210 FOR Y=DY-F-F TO DY-F
```

```
5220 GOSUB B
5230 NEXT Y
5240 RETURN
5300 LET Y=DY
5310 FOR X=DX TO DX+F
5320 GOSUB B
5330 NEXT X
5340 RETURN
5400 LET X=DX
5410 FOR Y=DY-F-F TO DY-F
5420 GOSUB B
5430 NEXT Y
5440 RETURN
5500 LET Y=DY-F-F
5510 FOR X=DX TO DX+F
5520 GOSUB B
5530 NEXT X
5540 RETURN
5600 FOR X=DX+1 TO DX+2
5610 LET Y=DY+F
5620 GOSUB B
5630 NEXT X
5640 RETURN
5700 LET X=DX
5710 FOR Y=DY-F TO DY
5720 GOSUB B
5730 NEXT Y
5740 RETURN
6000 REM UNPLOT
6010 FOR C=DC TO DC+2-(SUM>13)
6020 FOR R=DR TO DR+F+F
6030 LET A$(C,R)=CHR$ 0
6040 NEXT R
6045 NEXT C
6050 RETURN
7000 IF W$="A" THEN STOP
7005 LET W=0
7010 IF W$="E" THEN LET W=1
7020 IF W$="S" THEN LET W=9
7030 IF W$="W" THEN LET W=17
7035 IF W$="N" THEN LET W=25
7040 IF W$="NW" THEN LET W=57
7050 IF W$="NE" THEN LET W=49
7060 IF W$="SW" THEN LET W=33
7070 IF W$="SE" THEN LET W=41
7080 IF W$="VAR" THEN LET W=65
7090 IF W=0 THEN PRINT "NO SUCH
WIND DIRECTION.         *** TRY
AGAIN ***"
7093 IF W=0 THEN INPUT W$
7095 IF W=0 THEN GOTO 7000
7100 FOR I=1 TO 8
7110 LET A$(NX,NY+I-1)=D$(W+I-1)

7120 NEXT I
7130 IF SUM<=13 THEN RETURN
7240 PRINT AT 0,4;"ENTER WIND FO
RCE FOR :-"
7241 PRINT
7243 PRINT AT 2,4;L$
7245 GOSUB 6000
7250 INPUT N$
7255 LET N=0
7260 GOSUB 2008
7270 RETURN
9950 LPRINT
9951 LPRINT D;" ";M$;" ";Y$;" AT
 ";T;" HOURS,GMT:-"," "
9955 LPRINT
9956 CLS
9957 PRINT "USE GOTO 36 TO RUN A
GAIN"
9958 FAST
9960 GOTO 9988
9970 REM PLOTS(X,Y) INTO A$
9980 FAST
9981 IF X<0 OR X>255 OR Y<0 OR Y
>255 THEN RETURN
9982 LET C=1+INT (X/8)
9983 LET R=256-INT Y
9984 POKE 16526,CODE A$(C,R)
9985 POKE 16527,2**(8*C-INT X-1)

9986 LET A$(C,R)=CHR$ (USR 16514
)
9987 RETURN
9988 FOR I=0 TO 256 STEP 8
9989 FOR J=1 TO 32
9990 FOR K=1 TO 8
9991 POKE 32255+K+8*(J-1),CODE A
$(J,K+I)
9992 NEXT K
9993 NEXT J
9994 FOR H=0 TO 31
9995 POKE 16444+H,H
9996 NEXT H
9997 LET HPRINT=USR 31744
9998 NEXT I
```

are entered with the plotting routine at line 9970, taking X and Y co-ordinates from array C$(445); these are listed in Table 1 as DX,DY. Each digit is printed as a particular combination of seven segments, in much the same way that digits are displayed on calculators and watches (see Figure 2). They are as small as legibility would allow. Because pressures need 3 or 4 digits, and wind strength 1 or 2 digits, a routine was necessary to remove previous entries. By making sure that all digits were confined to elements of the 32 × 256 grid, the simplest way of 'unplotting' was to assign CHR$ 0 to the relevant elements. The sub-routine at line 6000 does this, using co-ordinates DC,DR retrieved from C$(445) (Table 1).

The wind direction arrows are added in a way similar to this 'unplot' sub-routine except that, instead of entering CHR$ 0, selected codes are retrieved from D$(72) which, when A$(32,256) is printed, will give the required symbol. You will see how this works from Figure 3. The arrow for Scilly in Figure 2 has been enlarged to show that the pattern of dots corresponds to the binary notation of the bytes contained in D$(17-24) when assigned to A$(12,220-227) respectively. There is no need for an 'unplot' routine because, when used again, the program will have the effect of over-writing the previous symbol.

When you are ready to use Program 4, Table 3 provides a list of representative data for all the Coastal Stations and Sea

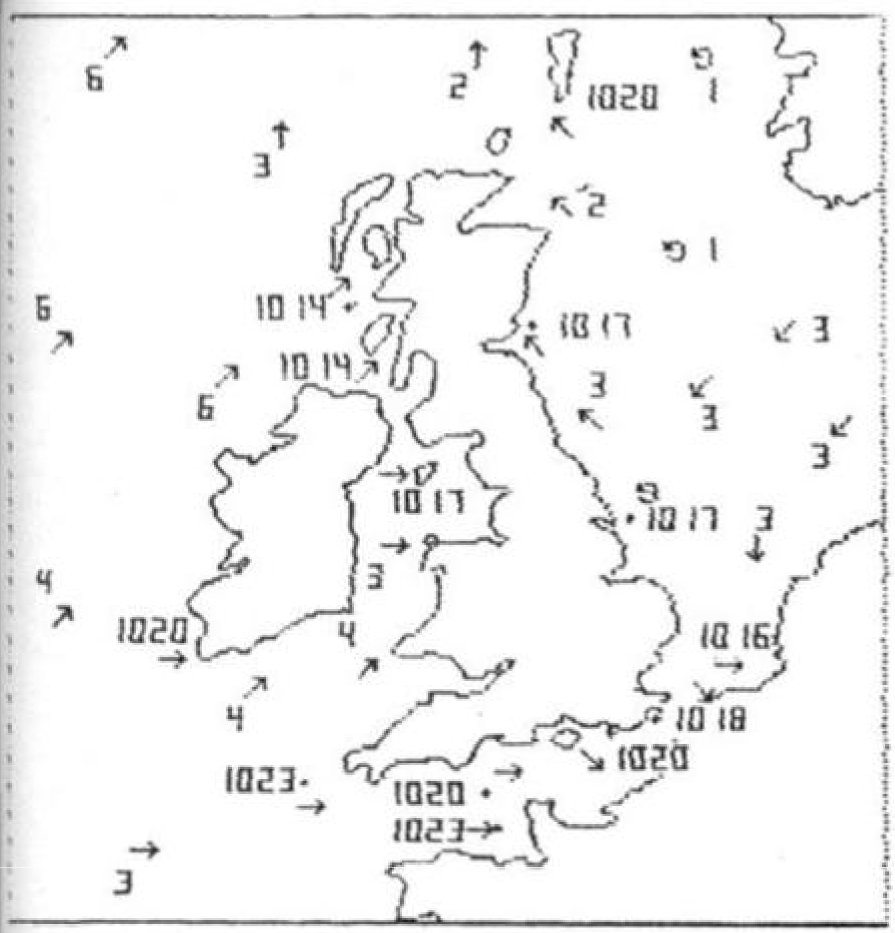


Fig. 1c The completed weather chart

Station / Sea Area

TIREE	1014	SW
SUMBURGH	1020	SE
BELL-ROCK	1017	SE
DOWSING	1017	VAR
GOEREE	1016	W
WARNE	1013	NW
ROYAL SOVEREIGN	1020	NW
CHANNEL LV	1020	W
SCILLY	1023	W
VALENTIA	1020	W
RONALDSWAY	1017	W
MALIN HEAD	1014	SW
JERSEY	1023	W
VIKING	1	VAR
FORTIES	1	VAR
CROMARTY	2	SE
TYNE	3	SE
DOGGER	3	NE
FISHER	3	NE
GERMAN BIGHT	3	NE
HUMBER	3	N
SOLE	3	W
LUNDY	4	SW
FASTNET	4	SW
IRISH SEA	3	W
SHANNON	4	SW
ROCKALL	6	SW
MALIN	6	SW
HEBRIDES	3	S
BAILEY	6	SW
FAIR ISLE	2	S

Table 3

Areas required. Later on, try recording a Shipping Forecast and extract from it some actual data. You will notice that I have had to omit a few Sea Areas altogether — there just was not enough room in the English Channel!

You should end up with a weather chart like the one in Figure 1c and, if you feel up to it after all this effort, you could try adding the isobars as in Figure 1d. You may need a wet weekend or two to do all this, but what a challenge!

GOOD LUCK!

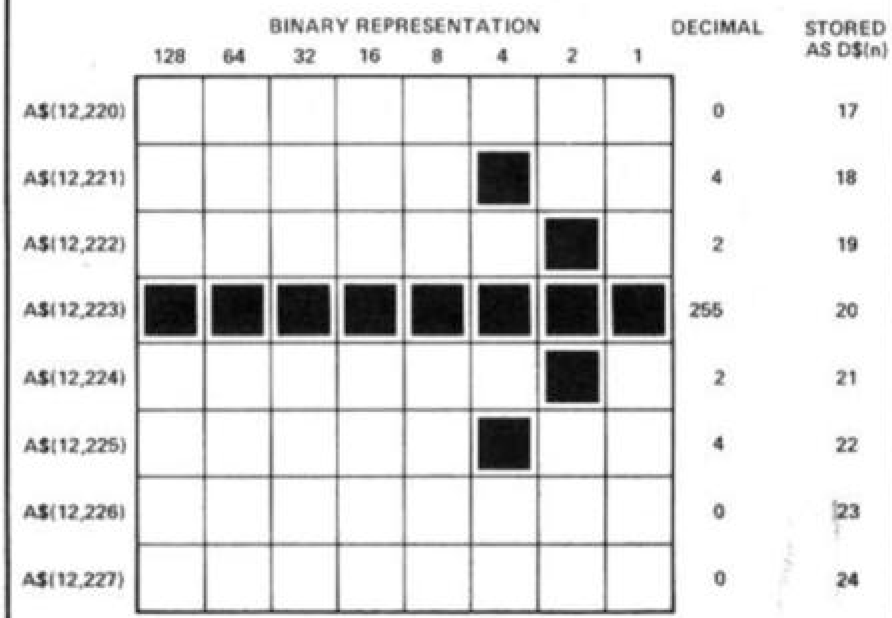


Fig. 3 The wind direction arrow for Scilly enlarged from fig. 2, showing how the contents of D$(72), when assigned to A$(32,256), form the chosen symbol

19 MAR 1983 AT 1200 HOURS,GMT:-

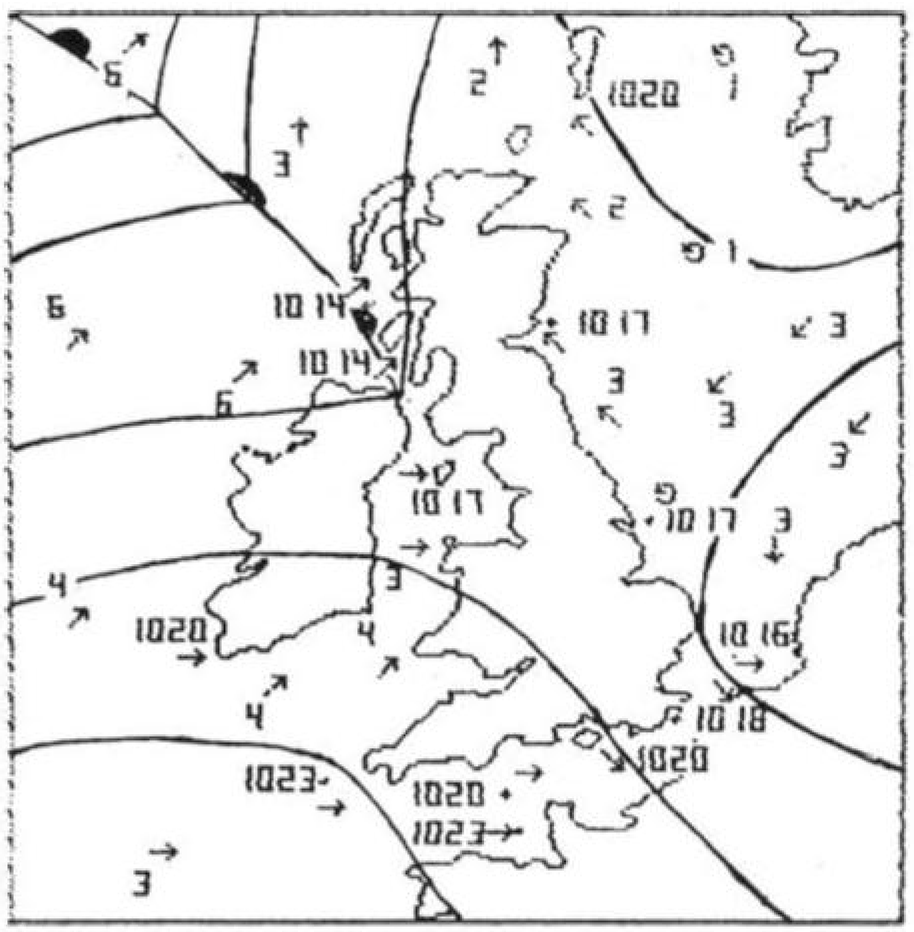
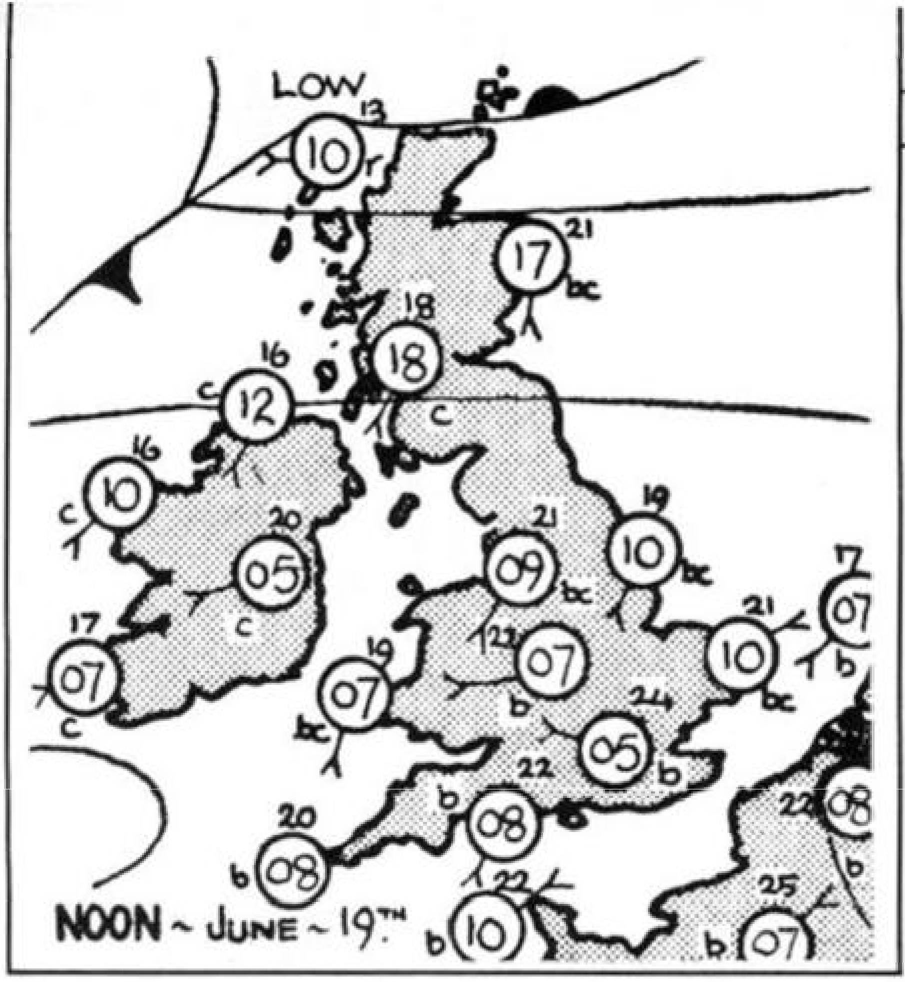


Fig. 1d Weather chart with isobars added by hand

Program Description

Lines	Description
1	Machine-code from ZX-printer manual.
6-8	Assigns numerical values to 'letter' variables to save space in memory.
10	Variable FL is used as a flag, set in line 86.
20-36	Modification of program given in ZX-printer manual.
37-94	PRINTS instructions; requests INPUTS.
95	Variable SUM is used to count the number of Coastal Stations/Sea Areas processed.
100-2500	Main processing loop.
1310	L$ holds the name of Coastal Station/Sea Area retrieved from C$(445).



1320-1420	Variables V(1-6) hold plot co-ordinates retrieved from C$(445).
2001	Checks if INPUT of Coastal Station data is complete.
2002-2006	INPUT of barometric pressure values.
2007	GOSUB 6000, the 'unplot' sub-routine which uses co-ordinates held in variables DC and DR.

2008-2500	Each digit of the barometric pressure values is assigned in turn to V$ and transferred to A$(32,256).
2008-2055	Sub-routine, called at line 7260, which transfers wind-force digit to A$(32,256).
2060-2080	INPUT and processing of wind-direction information; incorporates GOSUB 7000.
2090	Leave loop if all Coastal Station data has been entered.
2100	Leave loop if all Sea Area data has been entered.
3000-3070	Sub-routine of logic gates which examine the digit held in V$ and fork to other sub-routines at lines 5100-5740.
5100-5740	A series of sub-routines which set up the X and Y co-ordinates needed by the sub-routine at 9970 to plot each segment of the required digit.
6000-6050	The 'unplot' sub-routine.
7000-7270	Sub-routine of logical gates to set variable W to a value which is used to select from D$(72) the code which produces the chosen wind-direction arrow when transferred to A$(32,256) by lines 7100-7120 and printed.
7130	RETURN if Coastal Station data is being entered.
7240-7270	INPUT of wind-force data and its transfer to A$(32,256) using sub-routine 2008; also incorporates the 'unplot' sub-routine at line 6000.
9951	Caption sent to ZX-printer.
9970-9998	Sub-routine from ZX-printer manual that enters each point to be plotted using co-ordinates given by variables X and Y.

The ZX81 soft selection

Nick Pearce looks at some new releases for the ZX81

Merchant of Venus Crystal Computing

This 'adventure with graphics' program was first on sale in 1982, and has recently been re-released 'due to popular demand' as Crystal put it.

Merchant of Venus is certainly an abosorbing game. It combines real-time graphics simulation in which you control a leviathan space freighter *(whassat?)*, with the challenge of building a strong economy on Venus.

The program auto-runs upon LOADing, and your first task is to select the class of freighter you desire. They vary in price, and of course, quality. A cheap ship will possess only limited cargo-carrying capacity, and could cost you a small fortune in repairs!

Once a freighter has been selected, trading can commence. As you gain experience as a merchant, you discover how prices for the various commodities — Plasteel, Technetium, Mylar etc. — vary between differing regions of the planet. It is a matter of judgement to buy and sell at the most advantageous prices.

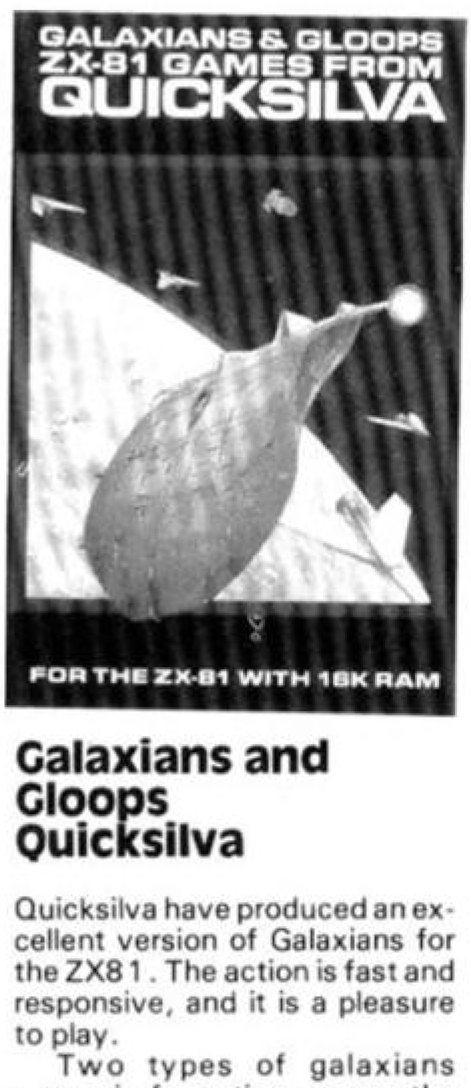
Take off is not always uneventful. Insufficient thrust will result in the freighter falling back to the planet. The screen displays the readout from the on-board computer, relaying information such as the vertical and horizontal velocities, and the state of the reactor core and fuel.

Once airborne and cruising, you are warned by the computer of any approaching landing base. As you descend the display changes and shows information from the ground tracking radar.

Piloting the freighter to a safe landing is not an easy task. If you are successful, a landing report details your touchdown velocity and the amount of damage sustained on landing. Trading can then continue.

Merchant of Venus is a complex and absorbing game, and fun to play. However, it requires most of the 16K RAM and as a consequence, the load-time of the game is quite considerable.

Crystal Computing are at 2, Ashton Way, East Herrington, Sunderland SR3 3RX.



Galaxians and Gloops Quicksilva

Quicksilva have produced an excellent version of Galaxians for the ZX81. The action is fast and responsive, and it is a pleasure to play.

Two types of galaxians move, in formation, across the top of the screen, and swoop down attacking your base. You have three lives available, while the speed, firing-rate and the number of swooping Galaxians are adjustable by the player.

Points are scored, in the usual fashion, by blasting the Galaxians as they fly. However, more points can be scored if the Galaxians are hit as they swoop down from the top of the screen.

Scoring is displayed on the screen, and at the end of each game, your score is entered into a league table which can cater for up to 15 games/players.

The first batch of swooping Galaxians are particularly good at searching-out and destroying your base, and some deft manouvreing is required to avoid their attack. Thereafter the battle is fierce but a high score can be achieved by the experienced player. If it becomes too easy, the level of difficulty can be soon increased.

Gloops

This cassette also contains Gloops, a version of the arcade type maze game. You move your 'Gobbler' eating up food pills which are worth about 10 points each. The 'Ghosts' will eat you if they catch you. If you can reach one of the power pills in the maze, you take your revenge for a short while and add 100 points to your score if you can catch a ghost. There are 10 different mazes to choose from, and the speed is selectable in 10 discrete steps. Action is responsive, making Gloops a first-class version of this popular game.

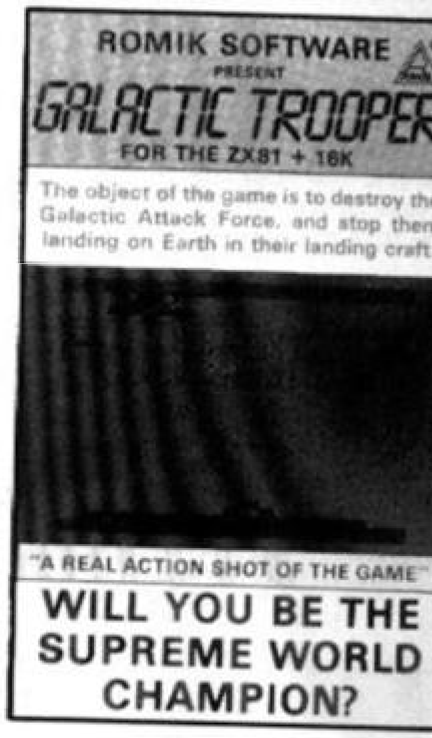
Now for the bad points! Although the instructions state that both Galaxians and Gloop auto-run upon loading, the review copy I had did not. To execute the program, I had to enter in immediate-mode, GOTO 1. This being said, both are impressive machine code games, and overall the cassette is a very reasonable buy.

Galaxians costs £4.95, and Quicksilva Ltd. is at Palmerston Park House, 13 Palmerston Road, Southampton SO1 1LL.

Galactic Trooper Romik Software

Galactic Trooper is another fast moving arcade type game from Romik. The landing craft of the galactic attack force are in formation in columns at the top of the screen. You move your craft along the bottom of the screen, trying to destroy as much of the force as possible before the inevitable happens ie you are obliterated. A mother ship services the galactic force; if you destroy it you gain 500 points.

There are three skill-levels available, but whatever skill level you select, the difficulty of the game continues to increase as the game goes along.



The action is good, but it is difficult to build up a high score. A fairly good game from Romik Software.

Romik Software Ltd is at 272 Argyll Avenue, Slough, Berks.

Frogger II The Software Farm

In this game, you have to help your frog to cross a very busy three lane road, a path, a river, and then into one of your 'frog-holes'. There are the usual hazards to make things difficult. Vehicles on the road must, of course, be avoided, and so must the ghosts which patrol the path, and the submerged turtles and ships in the river.

To cross the river, the frog must jump onto logs, floating or semi-submerged turtles, and the backs of crocodiles — but beware the heads and noses of these beasts!

There are three frogs per game, and a time limit. There is only one speed, which is perhaps a little slow. You do need to keep your wits about you, however, to build up a high-score. The turtles have a nasty habit of quickly submerging just after your frog has landed on them.

A good scoring system is included, featuring a hall of fame. Instructions are given on screen at the start.

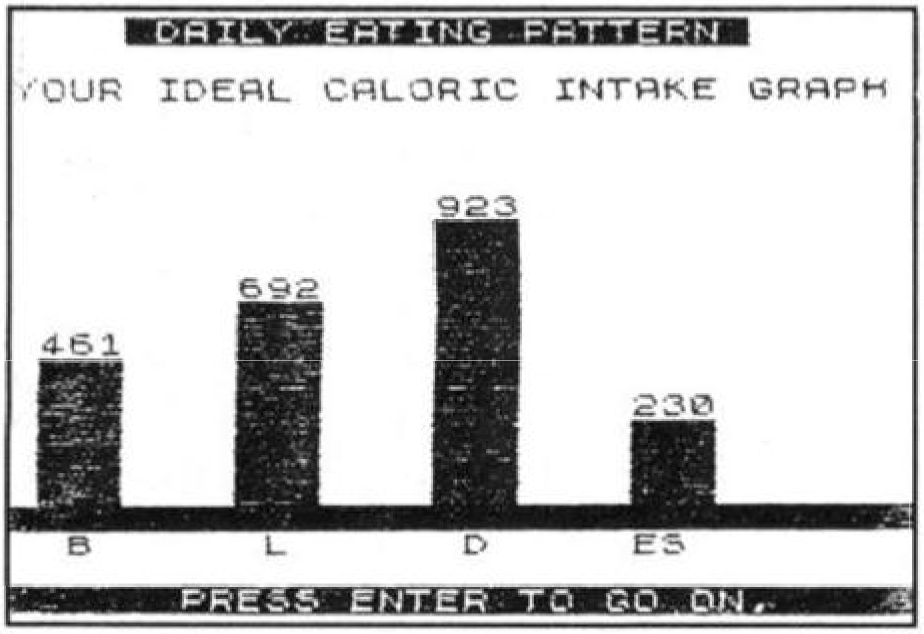
A fair game.

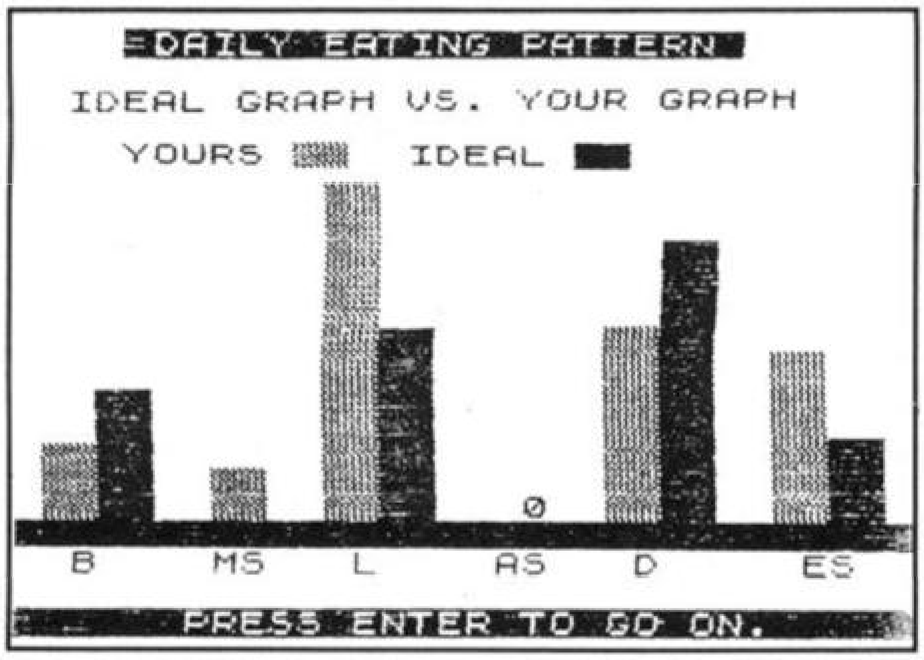
The Software Farm is at Craigo Farm, Botany Bay, Tintern, Gwent.

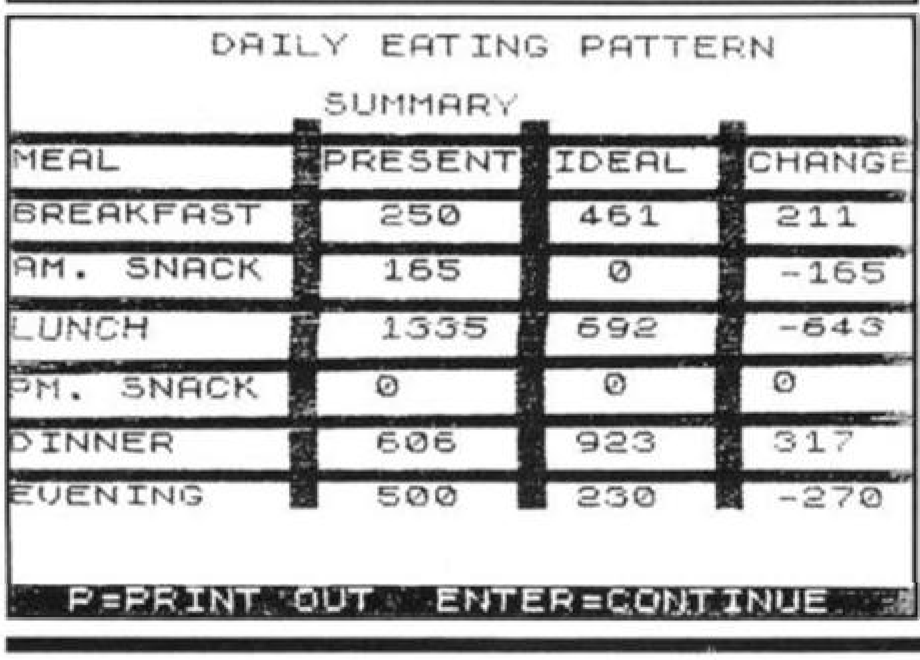
The Computerised Diet
Softchoice Ltd.

If you are a ZX81 owner, and would like to loose weight, The Computerised Diet might be of interest to you. It is a 'personalised' program, so after asking for your name, it goes on to ask your current weight and height, and your sex. Incidently, it was at this stage that I made my first mistake, of the classic 'not reading the instructions' variety, and entered my weight in stones rather than pounds. Consequently, when I proceeded to select my 'ideal' weight — 150 lbs. — I was told that I needed a weight change of 140 lbs. which would require a calorie intake of 2100 calories! This program needs error trapping!!

Upon entering my correct weight in pounds, I was told that I needed a weight change of 10 lbs., and a calorie intake of 2100 calories daily. The next step is to record the information onto a table in the booklet that accompanies the cassette.







DAILY EATING PATTERN

SUMMARY

MEAL	PRESENT	IDEAL	CHANGE
BREAKFAST	250	461	211
AM. SNACK	165	0	-165
LUNCH	1335	692	-643
PM. SNACK	0	0	0
DINNER	606	923	317
EVENING	500	230	-270

P=PRINT OUT ENTER=CONTINUE

The second part of the PSA (Present Status Assessment), asks 12 questions about current eating habits ie 'Do you eat quickly', 'Do you eat when bored' etc. Your bad habits are then listed on the screen and you are asked to enter them in the booklet.

Prior to using the program, the user must have kept a record of all food consumed over three to seven days. This is entered to build up your DEP (Daily Eating Pattern). For each meal you enter the calories consumed, and your mood at the time: anxious, bored, depressed etc. Tables in the booklet give calorie values of foods etc. Your daily eating habit pattern is summarised to give your average daily calorie intake, the calorie change required to give your desired weight, and predominant mood at snacks. Again, the data should be entered into the booklet.

The first side of the cassette ends with printouts in graphic and tabular format of your present, and ideal, calorie intake for each meal of the day. You can save your eating pattern to enable your progress to be monitored — a blank cassette is provided for this purpose.

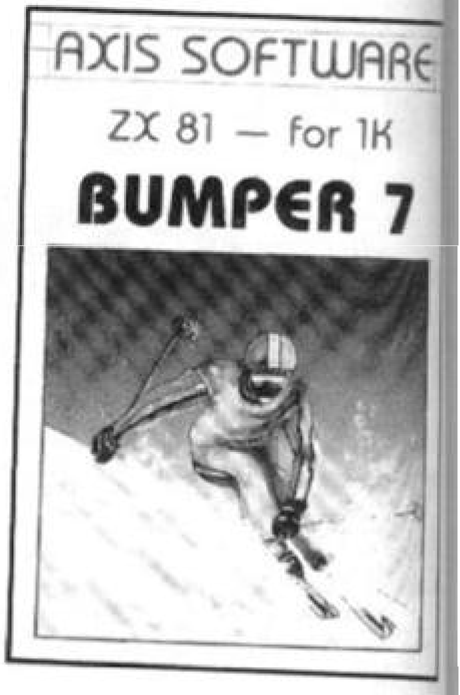
The reverse side of the cassette contains a menu building program. Briefly, the computer assists the user in developing the food groups (there are eight) and the servings of each group for each meal. This results in a balanced diet containing the requisite number of calories.

The two programs work quite well. Screen displays and data-entry are generally clear and are well thought-out. The printouts are good and the booklet is helpful.

Doctors generally agree that dieting should be coupled with exercise if a lasting weight loss is to be achieved. Also that correct food balance is, if anything, more important then pure calorie counting. Perhaps a development of this program to include all these factors would be worthwhile aim. As it stands, I am sceptical that it would be of real benefit to the overweight.

Strangely, whilst the computer hobbyists spend many hours hunched over their machines and have pale complexions as a result, few in my experience, are overweight. Perhaps their preoccupation with computing leaves insufficient time for other indulgences.

Softchoice Ltd, are at 52 Platts Lane London NW3 7NT.



Bumper 7
Axis Software

Bumper 7 contains no less than — you've guessed it — seven games for the 1K ZX81. Considering the limitations of the 1K machine, and the price of a 16K RAM pack these days, there can be few ZX81 owners with just the 1K machine. For those that do possess unexpanded ZX81's, this cassette contains a selection of games which illustrate certain features such as scroll and cursor control which may help with your own programs.

Repeat 20 is a memory test in which progressively larger numbers have to be remembered. The Slalom is a downhill ski-run in which the player has to guide the skier through 25 gates.

Also included within Bumper 7 are versions of Paper, Stone, Scissors (*This used to be called Ick, Ack, Ock. Don't ask me why — Ed.*); Snowflake, a game in which the aim is to catch a falling snowflake in a bucket; Patterns, an endlessly changing pattern-generation program; Banco, based on the card game *Chemin-de-fer;* and finally Sketch, which is a program to enable pictures to be drawn on the screen.

Bumper 7 is a good introductory cassette for the new-ish 1K ZX81 owner.

Axis (U.K.) Ltd is at 71 Brookfield Avenue Loughborough, Leics. LE11 3LN.

Correction!

In last month's issue I reviewed two games and gave the USA companies name and address. I would like to point out that the programs Signalman and Speedsnake are sold in England by Softchoice Ltd, 52 Platts Lane, London NW3 7NT.

List Option

Stephen Bugg's makes the ZX81 LIST like a Spectrum.

This program which will scroll through the lines of a program from any starting line you desire to the end or to any specified line.

As it stands it is not particularly helpful, but all it needs is renumbering to a suitable high line number (say 9000), and to be loaded into your computer and left there before each programming session.

Operating Instructions

RUN 1000 and GOTO 1000 will call the routine.
START LIST asks for the first line that is to be printed.
END LIST asks for the last line that is wished to be printed.
The program will now list the lines between these two line numbers inclusive, it will not stop until the end, unless the Pause Routine is called, this is done by pressing the "S" key, the Pause is disabled by the pressing of the "Q" key. By pressing the break key the user can stop the routine and the listing will remain on the screen. The line numbers used can be changed for something that is more acceptable such as 9800-9999, but the GOTO's will also need to be altered. Also the variable names may be changed if the same variable is used by the programs and cannot be changed. If the variables need to be retained then GOTO 1000 must be used as RUN 1000 will clear these variables.

Comments

1000-1003	Input bounds of printouts of lines.
1005-1008	Find bounds of memory allocated to program.
1009	If first line is not wanted then goto find first line sub-routine.
1010	Check for end of program.
1020	Read line number (first two bytes of line).
1022	Check if after last desired line number.
1025-1030	Print line number in front of LIST command, bbbXb.
1035	Increment address pointer by 2, number of bytes used for the line number.
1040	Reads number of characters in line.
1045	Increment address pointer by 2, number of bytes used for line length.
1050-1085	Loop for each item in line except newline at end.
1053	Check if pause is wanted. Pause routine at 1125.
1055	Load A with value of address to which is being pointed. X is first text address in line, Z is position in line.
1060-1065	Character 126 (NUMBER) follows a number in memory, and this is in turn followed by another 4 characters. These 5 characters do not want to be printed, and these 2 lines avoid this being done.
1070	Print character held in A.
1080	If Print line is 3 then move to SCROLL routine.
1095	Increment address pointer by length of line.
1010-1100	Loop for each line in program.
1105-1120	SCROLL ROUTINE
1105	Load B with Print column.
1115	Set Print position to correct position, one line above previous position. After scroll the next character will be printed immediately after previous character.
1125-1130	PAUSE ROUTINE
1125	Return to main routine if pause is to end, if "Q" is pressed.
1140	FIND FIRST DESIRED LINE
1140	Read line number.
1145	If reached starting position then goto main routine.
1165	Read line length.
1160&1170	Increment address pointer by line length.

Variables

A	Value of address at pointer.
B	Print column.
DFILE	End of program address.
ED	Last line desired.
ST	First line desired.
X	Address pointer, starts at 16509, line 1005 and is incremented as byte is read, Lines 1035, 1045, 1095, 1160, 1170.
Y	Line number (1020 and 1140) and Line length (1040 and 1165).
Y$	String to print out line length.
Z	Counter for line length.

```
1000 PRINT "START LIST "
1001 INPUT ST
1002 PRINT "END LIST "
1003 INPUT ED
1005 LET X=16509
1008 LET DFILE=PEEK 16396+256*PE
EK 16397
1009 IF ST>1 THEN GOTO 1140
1010 IF X>=DFILE THEN STOP
1015 SCROLL
1020 LET Y=PEEK X*256+PEEK (X+1)
1022 IF Y>ED THEN STOP
1025 LET Y$=STR$ Y
1030 PRINT AT 20,(4-LEN Y$);Y$;T
AB (5);
1035 LET X=X+2
1040 LET Y=PEEK X+PEEK (X+1)*256
1045 LET X=X+2
1050 FOR Z=0 TO Y-2
1053 IF INKEY$="S" THEN GOTO 112
5
1055 LET A=PEEK (Z+X)
1060 IF A=126 THEN LET Z=Z+5
1065 IF A=126 THEN GOTO 1085
1070 PRINT CHR$ (A);
1083 IF PEEK 16442=3 THEN GOSUB
1105
1085 NEXT Z
1090 PRINT
1095 LET X=X+Y
1100 GOTO 1010
1105 LET B=PEEK 16441
1110 SCROLL
1115 PRINT AT 20,33-B;
1120 RETURN
1125 IF INKEY$="Q" THEN GOTO 105
5
1130 GOTO 1125
1140 LET Y=PEEK X*256+PEEK (X+1)
1145 IF Y>=ST THEN GOTO 1010
1160 LET X=X+2
1165 LET Y=PEEK X+PEEK (X+1)*256
1170 LET X=X+Y+2
1175 GOTO 1140
```

Compac

Liverpudlians JD Rogers and C Hogg have produced yet another winner with this definitive Pacman type game.



J Dave Rogers



Colin Hogg

Unlike many maze/ghost-chase type programs this one is challenging and will be appreciated by the connoisseur of such games. The three independent ghosts have more than the average amount of intelligence, and in fact even with the *nine* extra lives allowed, experienced arcade players will need many plays before being able to clear all of the screens.

Most of the program functions, including man-movement, are in BASIC just the ghost movements and screen checks are in machine code, yet the speed is equal to the arcade versions. There are *twelve* carefully designed full-screen-size mazes (including 'tunnels'), all in a surprisingly compact listing.

In attaining this compactness only two things have been left out. One is 'power pills', the other is continuous (dot-counting) scoring. We think the quality of play and other features more than make up for these. The addictive quality of these types of games seems to lie in 'clearing screens' rather than scoring points.

Using the program, playing the game

There are two sets of mazes, either of which can be chosen upon running. The second set are considerably harder to clear and are really intended for when you've become successful on the first set and are looking for a further challenge!

A fixed score is given for clearing each screen, and since they are graded in difficulty, successive screens are worth more points (see table 1). Also, the ghosts are programmed to be a bit less vicious on screens one and two, but reach their 'full-strength' from screen three onwards.

When killed you are rejuvenated, using up one life, and carry on from the point where you were hit. Clearing a screen also gives you an extra life, and there is an added bonus of four extra lives if you can get past screen three.

If you happen to break the program, don't press RUN or you will have to wait for maze decoding (see later). Always enter 'GOTO 400' to re-execute the program.

To save the program always use 'GOTO 500' as this includes a 'clear' to erase the large arrays that are used and so drastically reduce loading time.

The ghosts will not follow you through tunnels. Maze 'C', in addition to having normal tunnels, has two 'bolt holes' which can be used as resting places where the ghosts can't get at you.

Screen	Points	Appearance	Tunnels	Title
A (G)	500	Grey	2 (4 + H)	Easy Street.
B (H)	2,000	Stripes	3 (4 + H)	Skid Row.
C (I)	4,500	Grey	4 (4 + H)	Mr. P. Acne.
D (J)	8,000	Quilted	2 + H (4 + H)	Roundabouts.
E (K)	12,500	Grey	None (4 + H)	Claustrophobia.
F (L)	18,000	Psychedelic	2 (4 + H)	Open-Field.

Table 1. Summary of screens (brackets indicate 'Second set' screens). H indicates Horizontal tunnel.

Storing mazes in a five bit code

To store six, full-screen-size mazes in the usual way (as strings of characters) would require 132 such lines to be typed in — making a tedious and error-prone total of over four thousand black and white blocks to be entered. In this program the mazes are held in the form of a five-bit code (see figure 2), where each maze line (32 characters) is 'crunched' into just *three* coded elements, giving a compression ratio of almost eleven-to-one! An 8-bit code was first considered but was awkward to type in and ambiguous, involving back-spacing to enter the characters needed to represent certain numbers, and 'chr$ N' to represent those not having a Sinclair code. Hexadecimal code was another possibility, but this only offered an 8-to-1 compression ratio.

The five bit code uses numerals 0 to 9 extended through characters A to V to represent binary numbers up to 31. Full stops can be used instead of zeros and provide occasional visual landmarks for even easier typing in.

On first running the program it takes two minutes to decode the information to form the actual mazes. This, however, works out to be *less* than the extra time it would have taken to load the program had the mazes all been held in strings. So overall time is saved, and since the program itself is made much shorter you also have the advantage of more reliable loading. Even more economical is that six extra mazes ('second set') can be obtained more or less for free by decoding the information for the main mazes in a different order. Only three program lines are needed for this (772-774).

Concerning Bug movements

The programming of (what looks like) intelligence into the enemy 'pac's' is not as simple as it may seem, and many pages could be written on this interesting but sometimes frustrating subject. A particular

algorithm may work perfectly in a given shape of maze only to fail in a slightly different layout. It is also advisable never to rely on oneself to be 'test pilot' during development, since a system that consistently outwits one person may be useless against somebody else who naturally tends to take different route decisions during play.

The common solutions, such as move towards player line then player column, produce 'stupid' enemy pac's that are forever getting stuck or will just jiggle up and down apparently unwilling to get past the slightest bend in the maze to catch you. Another typical behaviour is for all the pac's to follow the same path, in which case they are liable to stay in a 'train' behind the player, again offering no real challenge.

An interesting test for any pac move algorithm is a 'U' shape in the maze, or more accurately any construction that is *topologically* equivalent to a 'U'. Take a look at some commercial/arcade mazes — U shapes are avoided, except at the edges. Here it doesn't matter, because the situation 'player-under-the-U-with-pac-inside' can never arise, and it is this condition that can cause trouble.

The system used in this program is shown on the flowchart. It contains subroutines for moving in all four directions, but these are only called in response to a series of checks. The obvious moves directly towards player line and player column are tried first, and if none of these are valid, then scans are made for paths further afield. For compactness, the same central routine is used for all three pac's in turn, but information relevant to each pac is held in separate stores and flags (bytes are set aside for this at the end of the machine code rem line). The information on pack 'A' is first shifted into the pac move routine, the routine is executed, the pack is moved, then the new position and status of the pac are replaced into its store for use in its next move. This is then repeated for pac's 'B' and 'C'. Despite all three pac's using the same algorithm, they hardly ever follow the same paths as each other. This is because each pac is programmed to regard any other pac's as walls of the maze and so it will split off. In this way two pac's will often do a 'pincer' movement to trap you!

Use of RAND seed

The pac-move routine needs to

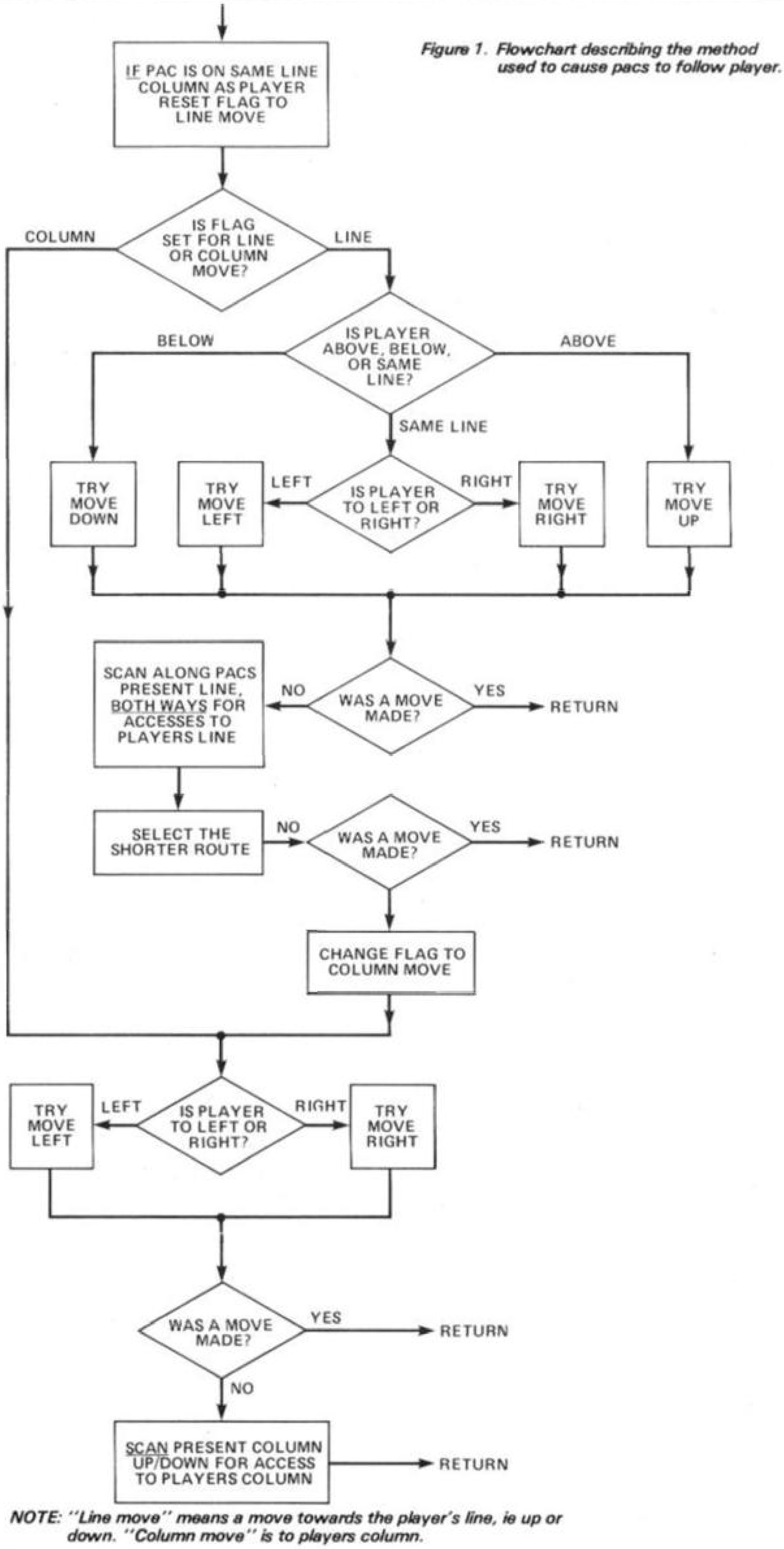


Figure 1. Flowchart describing the method used to cause pacs to follow player.

NOTE: "Line move" means a move towards the player's line, ie up or down. "Column move" is to players column.

know the players immediate line and column positions. So as not to slow down the program the 'RAND' function is used as an efficient means of transferring this information from the BASIC to the Machine Code. Changes in 'A' (across) only affect the low byte of the RAND seed, so this represents player column, while changes in 'D' (down) are multiplied by 256 and will therefore affect only the high byte, so this represents player line. The machine code can now go directly to the two fixed addresses of the RAND seed to obtain this information instead of messing about finding addresses in the Variables area, which is not fixed.

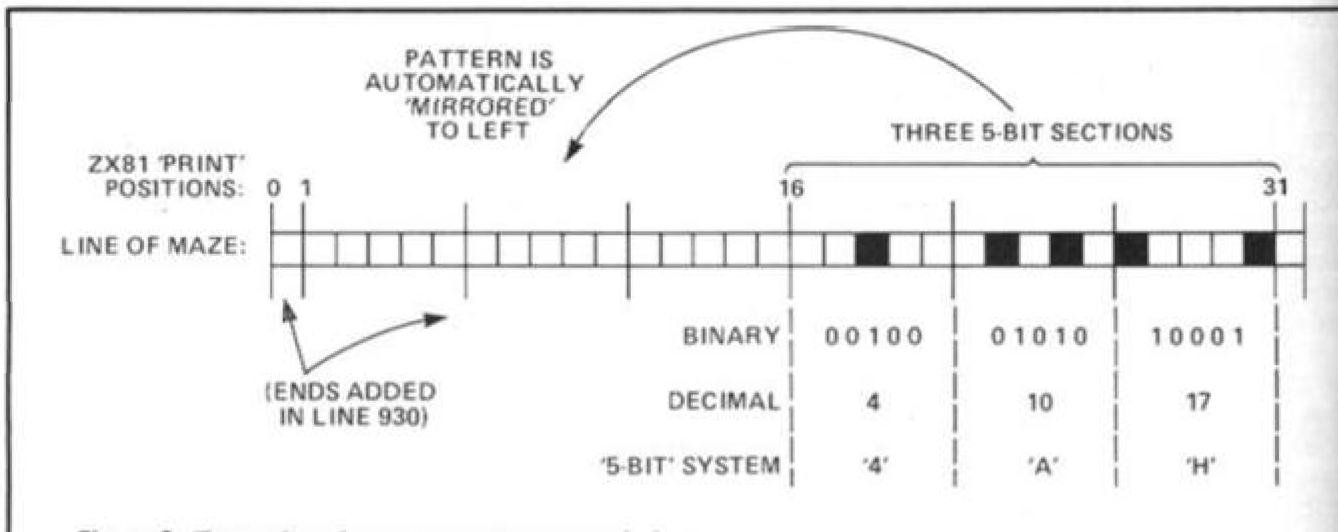


Figure 2. Illustration shows maze storage technique described in text.

Typing In — IMPORTANT

●Type in, as line 1, a Rem statement containing *exactly* 101 of any character.

●Enter as a direct command 'PRINT PEEK 16511'. If the answer is *not* 103 then line 1's length is wrong and must be corrected.

●Duplicate line one, four times by editing its line number to 2, then 3, 4 and five.

●Type in the hex loader, then run 9000 and enter the hex data one line at a time *including* the check figures (but not the spaces). The loader will intercept errors of any kind and prompt you until you get it right! The commonest mistakes are confusing B's, 8's, 6's and 5's, therefore we have redesigned parts of the ZX81 character set to look less ambiguous on the ZX printer.

●Type in main program, erase the hex loader, **save** a few copies on tape, then run.

●Check the mazes, if you spot any 'dead ends' in mazes A to E then you have made a mistake in entering the code for that maze so check in lines 710 to 760.

Unlike normal Rem statements, line 9999 is **not** optional, since it forms one of the 'trigger lines' used for tunnel movements (see later). Also, please consider the following points:

●Line 650 must contain **twelve inverse spaces.**

●Lines 700-800 are best entered in 'fast' mode, and note that these contain letter O's, not zeros, and I's as well as 1's.

●Line 250 — inverse 'MAZE' then an inverse minus. Do not use an inverse space.

●Line 9070 (part of Hex loader) — inverse 'ERROR'.

Do not attempt to alter line numbers between zero and 400 since the machine code causes line 90 to 'GOTO' certain preset lines. Check lines 265 and 395, and lines 870 and 890.

Customising

If you find some of the mazes a strain on the eyes then you can have them all in 'restful grey' by changing line 840 to read 'LET A = 136'.

Some people prefer the arcade type of free-running control response, i.e. if no keys (or more than one key) are pressed then the player continues to move in the same direction. This can be obtained by adding: 5 IF CODE INKEYS + ABS (D + A) 4 THEN GOTO 20

You can alter the actual control keys to those you feel most comfortable with by changing lines seven and ten.

To slow down the game (and add an extra effect) add '+ RND' to line 50. Custom points 2 and 6 also slow down the game.

For desperately bad players the final figure in line 100 can be changed to 5. This gives the advantage when turning corners to you rather than the ghosts, and even lets you take a breather to compose your wits by purposely running against a wall for a while.

A proper pause facility (for when the phone goes or you suffer a sneezing fit at a crucial stage of play) can be obtained by adding: 15 IF INKEY$ = "P" THEN PAUSE 4E4.

If you would prefer the player to restart at the top of the screen after being killed (as in arcade type) then relocate line 270 to 371 and line 280 to 372, erasing the originals of course.

To encode your patterns of mazes into the 5-bit format you should start at column sixteen of each line and work right, converting each group of five characters into a five-bit binary number. ie dot = 0, Maze wall = 1. Mazes should be left-right symmetrical.

The Basic

7-90	Players move routine.
30	If character at Intended Position is anything other than a dot or a space then GOTO further checks at line 100, otherwise:
40-60	Blank out previous position, POKE player onto screen at new position, update S.
70-80	Update Line-Column variable (LC) then use this as seed for RAND (see text).
90	Calls machine code to move the three 'ghosts' and do screen checks, then "goes to' one of the following lines: Normally ---------line 5 If player has been hit by ghost --- line 300 If screen has been cleared of dots --- line 200
110	If player hits one of the 'trigger lines' (consisting fo CHR$ 21) above and below the maze area then a "tunnel" move is performed by setting D to either 21 or minus 21 (depending whether player is at top or bottom of screen). Upon re-entering the main loop, D now alters the players position by means of line 20 (to re-emerge from the opposite tunnel) and **also** updates 'LC' to suit by means of line 70.

Note

Only the lower trigger line is actually visible on the screen, the other one is within the program (line 9999) which since it is the very last thing in the program area of memory is effectively one line above the screen (display file — Refer to memory map in ZX manual). This leaves more room on screen for the actual game.

200-290	When a screen is cleared updates score, adds another life (or bonus of four lives for reaching screen four), pauses, does 'rollover' effect then prints next mazes and resets players position. In the unlikely (!) event of a player clearing the sixth screen the sequence goes back to screen one.
270-280	Resets Line-Column variable to coincide with players starting position.

Note

One is added on to LC during screens one and two, thus slightly disorientating the ghosts since they now 'see' the player as being one space to the side of his real position. This is done to make the first two screens slightly easier, then in screen 3 onwards the ghosts come up to 'Full strength'.

300-395	When player is hit takes away one life, flashes both the player and the life that is being used up. User call then returns ghosts to starting positions. If all lives used up ends game.
400-480	New game, resets various variables.

500	Selfsave and setting up.
630-640	Sets up arrays to hold mazes and maze data
700-770	Storage strings, holding the data for all six mazes in compact '5-bit' form. **Note:** for greater readability the extreme conditions of zero and thirty one are represented as full stops and X's respectively.
800-970	Routine that decodes the data into actual mazes. This consists of three nested for-next loops: M loop — for mazes one to six. X loop — for items of data one to 66 loop — extracted from each storage string. N loop — for bits one to five of each item.
840	Alters the characters used to build certain mazes. Normal value of 136 gives a grey maze.
890	Builds up each maze line 'from the centre outwards' and thus mirrors the maze symmetrically to the left and right.
920	Continues X-loop until a line of 30 characters has been built up, line 940 then adds 'ends' to that line and places it into position within the appropriate maze array (M$).
771	Repeatedly concatenates the string of inverse spaces B$ into a whole screen full. Used to give 'rollover' effect between screen.
773-774	Shifts the data int he storage strings about so that when decoded different shaped mazes are produced ('second set').

Machine code

The machine code moves the three ghosts, checks for man-hit and for screen cleared. All addresses are in hexadecimal.

4082-40AE	Set up pacs in starting positions using data from the fixed stores (see later).
40AF-40BC	Scan whole screen for remaining dots, if none are found then return to Basic with value of 200, which is then used as the 'GOTO' value in line 90.
40BD-40E0	Call bug moves. Puts data from bug 1's store into workspace, calls pac move, then replaces data to store when move completed. Repeats this for pacs 2 and 3.
40E2-40F6	Player-hit check. The characters that are to be replaced behind each pac as it moves are held in stores, so by looking at these, if any contains the 'player' character then player must have been hit. If so, jumps to routine at 40F7 which wipes out all the pacs, replaces them at start positions and then returns to Basic with value of 300, so line 90 'goes to' player hit routine.
40F3-40F6	If player not hit, returns to Basic with value of 5, so line 90 continues movement loop to line 5.
4112-413F	Set working flag. Sets various bits of working flag (4290) according to pac position **relative** to players position. i.e. above, below, same line, etc.
4141-4166	Move decisions (see flowchart).
4167-416F	Try move towards player line.
4171-4175	Try move towards player column.
4177-41B9	Movement routines for all four directions. When called, checks if move is valid, if so does move, updates pac line/column and resets carry to zero, if not sets carry to 1.
41BA-41FD	Column scan. Scans pac column up and down to find horizontal access to player colum. Having found this, calls relevant movement routine. If no move possible, sets carry.
41FF-4259	Line scan. As for column scan but horizontally, *plus* a comparison is made between routines left/right and the shorter of the two is taken.
4268-end	Various stores. Information for each pac is held in a standardised order: pac 1, pac 2, pac 3. For each bug; two positions, column, line, Flag byte, chr$ for replacing behind.
4268-4279	Fixed stores containing start values (read only)
428C-4291	Working store holding information on current bug being moved.

The variables

Players Variables

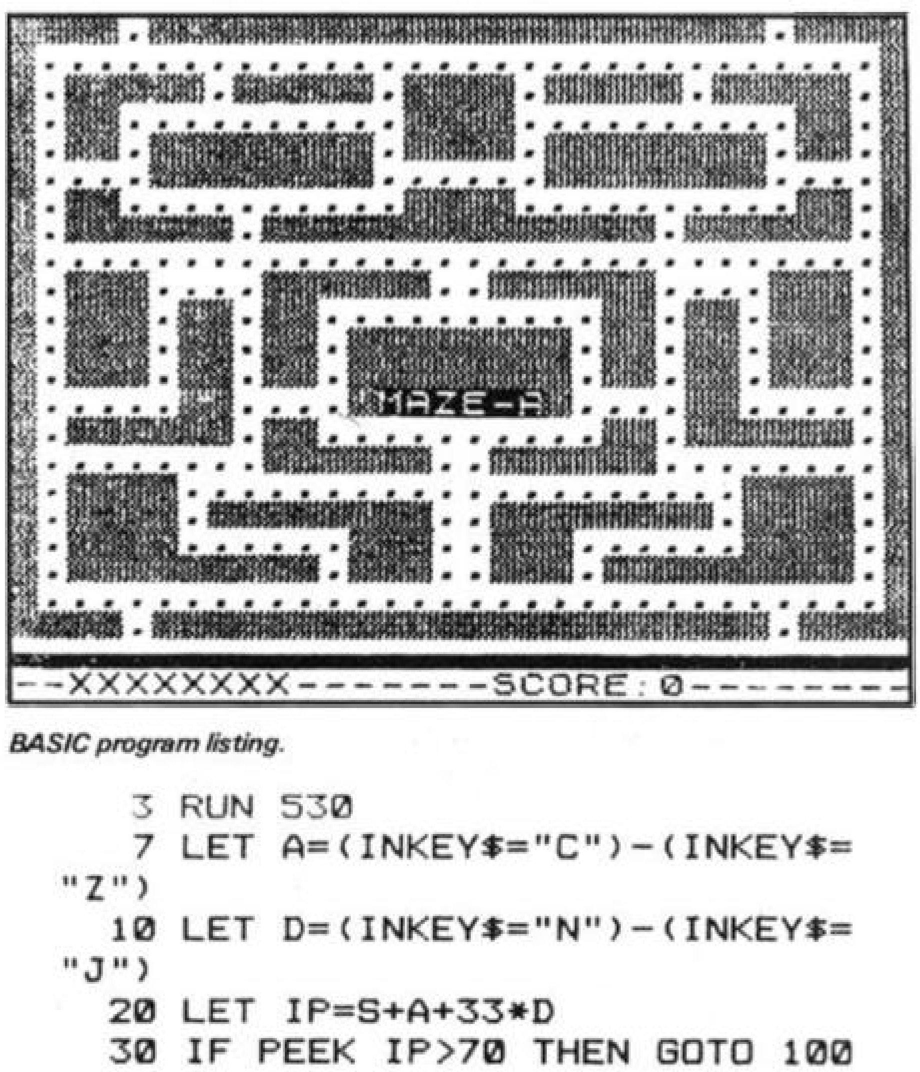
A	Across movement.
D	Down/up movement.
IP	Intended position.
S	Screen position.
LC	Line/column. Represents both line and column position (one in high byte — *256 — the other in low byte) for reference by machine code.

Other variables

SC	Score.
LYF	Life remaining.
MZ	Maze number.
X	Marks start of display File in memory.
SS	The "Second set" of mazes are produced if this equals one, main set if zero.
S$ (1 to 6)	Storage strings, containing maze data in 5-bit code form.
M$ (1 to 6)	Maze strings, into which actual mazes are built up.
U$	General-purpose, also used in decoder.

Decoder variables.

K	Determines type of character used for walls of maze.
S	Single value extracted from storage string for decoding.
D	Divisor. Stars at 16 (bit-five) then reduced to 8 to decode bit 4, and so on down to bit 1.
U$	String into which each line of maze is built up before being placed into a maze array.
A	Code for character produced by decoding current bit.



BASIC program listing.

```
   3 RUN 530
   7 LET A=(INKEY$="C")-(INKEY$=
"Z")
  10 LET D=(INKEY$="N")-(INKEY$=
"J")
  20 LET IP=S+A+33*D
  30 IF PEEK IP>70 THEN GOTO 100

  40 POKE S,0
  50 POKE IP,61
  60 LET S=IP
  70 LET LC=LC+D+(256*A)
```

```
 80 RAND LC
 90 GOTO USR 16559
100 IF PEEK IP>135 THEN GOTO 90

110 IF CHR$ (PEEK IP)="▄" THEN
LET D=21-(42 AND IP>X)
120 IF PEEK IP=118 THEN LET A=
    31-(62 AND PEEK (IP-32)<70)

130 GOTO 20
200 REM -----NEXT SCREEN------>

210 LET SC=SC+500*(MZ**2)
220 LET LYF=LYF+1+(4 AND MZ=3)+
(11-LYF AND LYF>11)
230 LET MZ=(MZ AND MZ<6)+1
240 PAUSE 100+(4E4 AND SC=0)
250 LET M$(MZ,430 TO 435)="MAZE
"+CHR$ (165+(6 AND SS=1)+MZ)
260 PRINT AT 0,0;B$;AT 0,0;M$(M
Z)+"▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄
▀▀▀▀-----------------SCORE:-----
----";AT 23,23;SC
265 IF SS=1 OR MZ=4 THEN PRINT
AT 13,0;"  ";TAB 30;"  "
270 LET S=X+50
280 LET LC=4097+(MZ<3)
290 GOTO 360
300 REM -----MAN HIT/END?----->

301 PRINT AT 1,0;"DEMO ONLY: ER
ASE LINES 301/302  THEN GOTO 400
 TO PLAY"
302 GOTO 200
310 LET LYF=LYF-1
320 FOR N=4 TO 22
330 POKE S,22+RND*2
340 PRINT AT 23,LYF+1;CHR$ N
350 NEXT N
360 RAND USR 16516
370 PRINT AT 23,1;"-XXXXXXXXXX
XXXXX"( TO LYF)
380 IF LYF>0 THEN GOTO 7
390 PRINT AT 3,29;" ?";AT 2,10;
"--GAME-OVER--";TAB 1;" WOULD YO
U LIKE ANOTHER ONE ? "
395 GOTO 370+30*(INKEY$="Y")
400 REM --------NEW GAME----->
410 POKE 16418,0
420 PRINT AT 0,0;B$;AT 5,1;"CON
TROL KEYS: Z=LEFT  C=RIGHT ";AT
7,15;" J=UP    N=DOWN ";AT 17,2;
" ▌▌▌ HIT ANY KEY TO PLAY ▌▌▌ "
430 LET SC=0
440 LET LYF=9
450 LET MZ=1
460 LET X=PEEK 16396+ 256*PEEK
16397
470 SLOW
480 GOTO 240
500 REM ---AUTOSAVE/SET UP---->

510 CLEAR
520 SAVE "COMPAC"
COLIN.HOGG(MC)/J.DAVE.ROGERS(B)
530 PRINT "PRESS NEWLINE THEN W
AIT 2 MINS",,,"OR ENTER ""S"" FO
R SECOND SET OF  MAZES"
540 LET S=0
550 LET A=0
560 LET D=0
570 LET IP=0
580 LET LC=0
590 RAND 0
600 INPUT U$
610 LET SS=U$="S"
620 FAST
630 DIM M$(6,704)
640 DIM S$(6,66)
650 LET B$="████████████████"
700 REM ------MAZES-DATA----->
710 LET S$(1)="XXN...RTUO.6RXM3
XGO.6XRU...FOE.REUREUREU3..RUFO.
..UFUUE.UEXU...XXNC"
720 LET S$(2)="FTX...UNQUNQUK2U
LQ.5QNLONLQ.HQULQULQU42UTU.TUNTU
...FDUFC6FFM...FTXH"
730 LET S$(3)="XXG7XM..6FGU1UUK
62NNQG1Q5S.K1Q7NIS421TUT..TEN..N
XUG..MURGURN.O6XXMJ"
740 LET S$(4)="XNX..FFLFE5.ELQ6
42MTC.12FNEFGEFXEFXE1GETLE.12UTA
U.2ULQU4.XLF..FXNXD"
750 LET S$(5)="XXX...UNA.N8UNEG
G.NRUG3.MREMREK82LBQ18ATBA13ATBA
S82TFQ1..XUX...XXXR"
760 LET S$(6)="XXN...UUUUUM..MU
UMUUM...XUUXUU...UUMUUMUUU...TEM
TEM..UUUMUUM...XXNW"
770 FOR N=1 TO 6
771 LET B$=B$+B$
772 IF SS=0 THEN GOTO 775
773 LET U$="NXR7XRG.."+S$(N,COD
E "C2V8VF"(N)-28 TO )+S$(6)
774 LET S$(N)=U$( TO 42 )+"1U.S
"+U$(47 TO 57)+"G..NXRNXR"
775 NEXT N
776 LET U$=""
800 REM ---QUINBIT-DECODER---->

810 FOR M=1 TO 6
820 FOR X=1 TO 66
830 LET S=CODE S$(M,X)-28
840 LET K=136+(M=2)+(41 AND M=4
)+(RND*20 AND M=6)
850 LET D=16
860 FOR N=1 TO 5
870 LET A=27+(K-27 AND S/D>=1)
```

```
 880 LET U$=CHR$ A+U$+CHR$ A
 890 IF S/D>=1 THEN LET S=S-D
 900 LET D=D/2
 910 NEXT N
 920 IF LEN U$<30 THEN NEXT X
 930 LET M$(M,32*X/3-31 TO )=
CHR$ K+U$+CHR$ K
 940 LET U$=""
 950 NEXT X
 960 NEXT M
 970 GOTO 400
9999 REM THIS LINE IS ESSENTIAL;
```

Hex dump.

```
--------HEX DUMP--------CHECK
00 00 21 6B 42 11 7A 42 409
01 12 00 ED B0 ED 5B 0C 774
40 2A 7A 42 19 36 8B 22 549
7A 42 2A 80 42 19 36 8B 646
22 80 42 2A 86 42 19 36 554
8B 22 86 42 C9 2A 0C 40 698
01 18 03 3E 1B ED B1 01 539
C8 00 C0 3E 03 32 21 40 612
21 7A 42 11 8C 42 01 06 460
00 C5 E5 D5 ED B0 CD 12 1285
41 E1 D1 C1 ED B0 EB 3A 1409
21 40 3D 32 21 40 20 E3 576
16 03 21 7F 42 01 06 00 271
7E FE 3D 30 08 09 15 20 573
F7 01 05 00 C9 36 00 3A 581
7F 42 2A 7A 42 77 3A 85 749
42 2A 80 42 77 3A 8B 42 701
2A 86 42 77 01 2C 01 C9 626
21 90 42 7E E6 01 77 3A 796
32 40 ED 4B 8E 42 B8 28 878
06 38 08 CB D6 18 06 CB 741
DE 18 02 CB CE 3A 33 40 852
B9 28 06 38 08 CB EE 18 783
06 CB F6 18 02 CB E6 CB 1141
76 28 02 CB 86 CB 46 20 827
0F CD 67 41 D0 21 90 42 865
CB 5E 20 04 CD FF 41 D0 1093
21 90 42 CB C6 CD 71 41 1055
D0 CD BA 41 C9 CB 5E 20 1223
06 CB 56 20 10 18 06 CB 606
66 28 1A 18 10 01 DF FF 718
11 00 FF 18 16 01 21 00 384
11 00 01 18 0E 01 FF FF 600
11 FF FF 18 06 01 01 00 593
11 01 00 2A 8C 42 3A 91 504
42 77 09 7E FE 40 30 11 739
32 91 42 22 8C 42 36 8B 731
2A 8E 42 19 22 8E 42 AF 730
C9 2A 8C 42 36 8B 37 C9 937
3A 90 42 21 01 00 CB 6F 656
20 03 21 FF FF 22 7B 40 840
2A 8C 42 E5 D1 01 DF FF 1207
09 01 21 00 EB 09 EB 7E 691
FE 40 D2 7F 41 1A FE 40 1108
D2 77 41 ED 4B 7B 40 E5 1167
09 7E E1 FE 40 DA 77 41 1126
D5 EB 09 7E EB D1 FE 40 1392
DA 7F 41 18 D4 AF 32 7B 1042
40 11 DF FF CB 4E 20 03 924
11 21 00 01 00 00 2A 8C 283
42 2B 04 7E FE 40 30 0A 666
E5 19 7E E1 FE 40 30 F1 1264
18 05 21 7B 40 36 02 2A 400
8C 42 23 0C 7E FE 40 30 799
0A E5 19 7E E1 FE 40 30 1036
F1 18 04 21 7B 40 34 3A 655
7B 40 FE 03 20 02 37 C9 791
FE 02 CA 8F 41 FE 01 CA 1181
87 41 78 B9 DA 87 41 C3 1177
8F 41 41 00 00 00 00 00 333
00 00 00 00 00 00 BC 01 250
0E 0D 01 A6 BD 01 0F 0D 474
00 BF BE 01 10 0D 00 AA 644
24 24 24 24 25 25 25 25 356
```

BASIC hex loader program.

```
   1 REM
   2 REM THESE FOUR LINES EACH
         CONTAIN 101 CHARACTERS
   3 REM PLEASE READ TEXT BEFORE
         ENTERING.
   4 REM
8997 REM **********************
8998 REM   SELF CHECKING HEX
                 LOADER
8999 REM **********************
9000 POKE 16510,0
9010 POKE 16511,19
9020 POKE 16512,2
9030 FOR L=1 TO 63
9040 PRINT AT 17,4;"OK---ENTER L
INE ";L
9050 LET X=16514+8*(L-1)
9060 GOTO 9080
9070 PRINT AT 17,4;"ERROR,REDO"
9080 INPUT U$
9090 IF LEN U$<17 THEN GOTO 9070

9100 LET C=0
9110 FOR N=0 TO 15 STEP 2
9120 IF U$(N+1)>"F" THEN GOTO 90
70
9130 POKE X+N/2,16*CODE U$(N+1)+
CODE U$(N+2)-476
9140 LET C=C+PEEK (X+N/2)
9150 NEXT N
9160 IF C+L<>VAL U$(17 TO ) THEN
 GOTO 9070
9170 NEXT L
```

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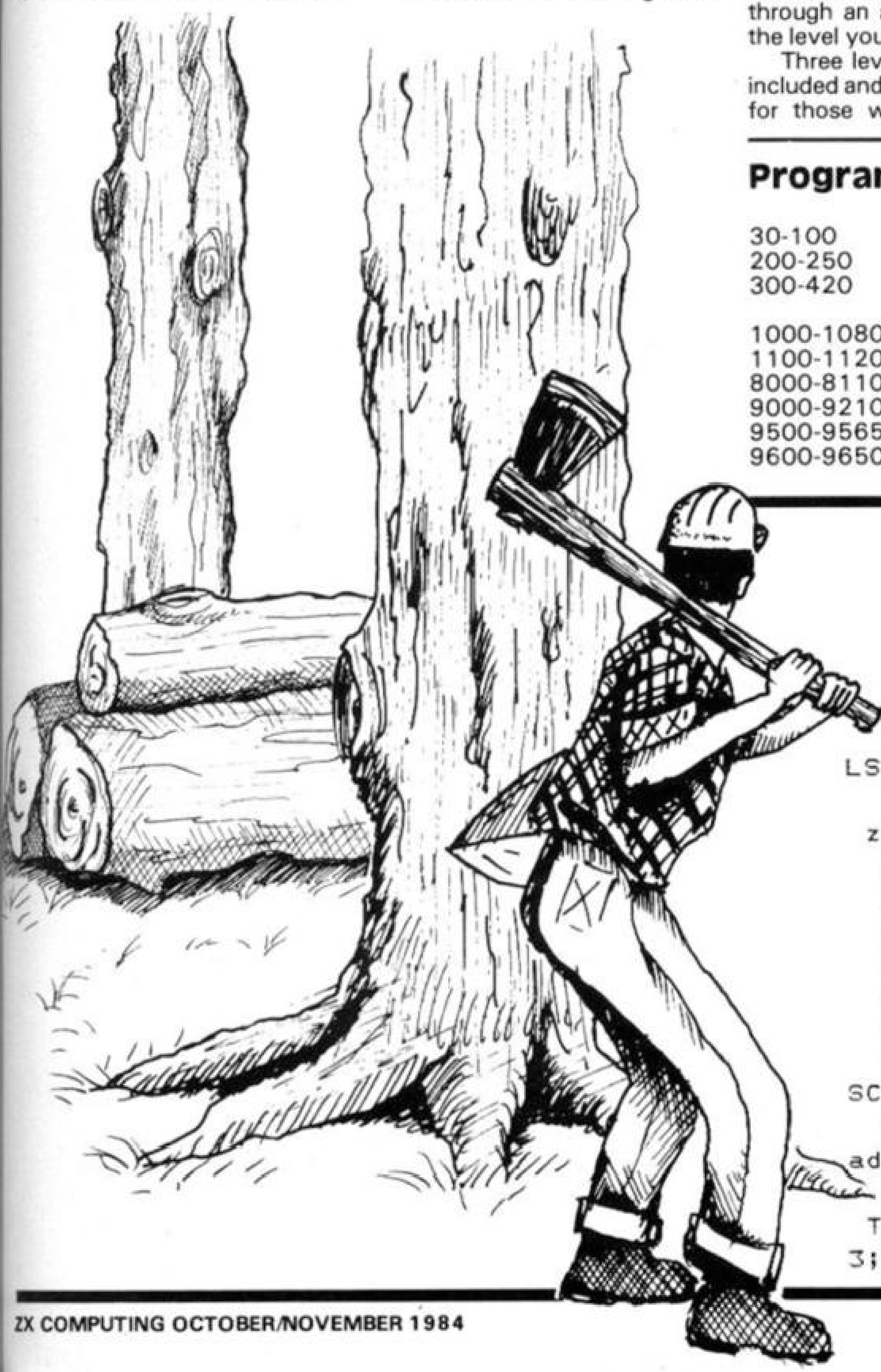
Log Hop

Would be Lumberjack Christopher Gibbs sent us this challenging program from Reading Forest.

A program which is as addictive as this and yet written in BASIC is a rare thing indeed. Christopher has created a game which is not only fast but fits into 16K with room for titles as well! As can be inferred from the title, the game involves jumping over logs and up through gaps to reach the rings at the top of the screen.

You control a running man with keys 5 and 8 for left and right movement and key 0 to jump. If you jump and miss the hole above you, you will be rendered unconscious for a short period of time and may fall through an approaching gap in the level you have reached.

Three levels of difficulty are included and a hall of fame chart for those who become adept enough to reach a good score. Christopher says his highest score so far is 93%, I admit to not getting any score at all — mind you, I wasn't feeling too well. The score is worked out on the time you take to reach the rings. So for a real test of your ability type in this relatively short program — go on, hop to it!



Program structure

30-100	Main loop
200-250	Fall down hole routine
300-420	Death routine, score assessment and hall of fame update
1000-1080	Jump routine
1100-1120	'Reached the rings' routine
8000-8110	Presentation and instructions
9000-9210	Graphics
9500-9565	Random set up of logs
9600-9650	Screen set up at start of game

```
   1 REM **********************
        *Underlined characters*
        *are entered in       *
        *GRAPHICS mode.       *
        **********************
   2 POKE 23658,8
   3 PAPER Ø: INK 7: BORDER Ø: C
LS
   5 LET HOLE=Ø: LET game=Ø: DIM
 z(1Ø): DIM f$(1Ø,3)
  1Ø GO SUB 8ØØØ
  12 LET SCORE=1ØØØ: LET dead=Ø
  13 LET game=1
  15 LET x=19: LET y=1Ø
  2Ø LET e$="B"
  3Ø FOR m=31 TO 1 STEP -1
  31 IF SCORE>1 THEN  LET SCORE=
SCORE-2
  32 IF dead>Ø THEN  LET dead=de
ad-1: BEEP Ø.Ø5,-1Ø
  4Ø PRINT  INK 6;AT 5,Ø;a$(32-m
 TO );a$( TO 32-m);AT 1Ø,Ø; INK
3;b$(m TO );b$( TO m);AT 15,Ø; I
```

```
NK 4;c$(32-m TO );c$( TO 32-m);
INK 7;AT 20,0;d$(m TO );d$( TO m
)
  43 IF dead>0 THEN  GO TO 55
  45 IF m/2=INT (m/2) THEN  LET
e$="B"
  46 IF m/3=INT (m/3) THEN  LET
e$="K"
  50 PRINT  INK 6;AT x,y;" ";e$;
" "
  53 IF m/3=INT (m/3) THEN  GO T
O 57
  55 IF SCREEN$ (x+1,y+1)=" " TH
EN  GO SUB 200
  57 IF dead>0 THEN  GO TO 100
  60 LET y=y+(INKEY$="8")-(INKEY
$="5")
  85 IF y<0 THEN  LET y=29: PRIN
T AT x,0;"  "
  86 IF y>29 THEN  LET y=0: PRIN
T AT x,29;"  "
  90 IF INKEY$="0" THEN  GO SUB
1000
  95 LET e$="A"
 100 INK 7: NEXT m: GO TO 30
 200 REM FALL
 205 INK 6
 210 IF x=19 THEN  GO TO 300
 220 FOR n=x+1 TO x+5: PRINT AT
n,y+1;"H";AT n-1,y+1;" ": BEEP 0
.05,20-n: NEXT n
 230 LET e$="E": LET x=n-1: PRIN
T AT x,y+1;e$: LET dead=D*2:
 240 IF SCREEN$ (x+1,y+1)=" " TH
EN  GO TO 210
 250 RETURN
 290 REM DEATH
 300 PRINT AT 19,y+1;"H": PAUSE
2: PRINT AT 20,y+1;"H";AT 19,y+1
;" "
 305 BEEP 0.1,0
 310 PRINT AT 20,y+1;" "
 320 FOR n=y+1 TO 30: PRINT  INK
 5;AT 21,n;"F"; INK 6;"E": BEEP
0.05,30-n: NEXT n: PRINT  INK 5;
 BRIGHT 1;AT 21,31;"F"
 321 FOR n=1 TO 10: NEXT n: LET
SCORE=0: GO TO 330
 325 LET SCORE=INT (100*(SCORE/1
000))
 330 PRINT AT 2,10;"          ";
AT 3,10;"          ";AT 4,10;"
          ";AT 3,10;"SCORE=";SCORE
;"%"
 340 PRINT AT 17,3; FLASH 1;"PRE
SS ENTER TO CONTINUE": IF CODE I
NKEY$<>13 THEN  GO TO 340
 345 CLS
 350 FOR n=1 TO 10: IF SCORE>z(n
) THEN  GO TO 400
 360 NEXT n
 370 PRINT AT 0,5;"TODAYS GREATE
ST": FOR n=1 TO 9: PRINT AT n*2,
6;n;"=";" ";f$(n);" ... ";z(n):
NEXT n: PRINT AT 20,5;10;"= ";f$
(10);" ... ";z(10)
 380 GO TO 9515
 400 FOR m=10 TO n+1 STEP -1: LE
T z(m)=z(m-1): LET f$(m)=f$(m-1)
: NEXT m: LET z(n)=SCORE
 410 INPUT "ENTER YOUR INITIALS
(MAX 3) ";g$: IF LEN g$>3 THEN
GO TO 410:
 420 LET f$(n)=g$: GO TO 370
1000 REM JUMP
1005 INK 6
1007 IF x=4 AND y+1=po THEN  GO
TO 1100
1010 IF SCREEN$ (x-4,y+1)="©" TH
EN  LET dead=D*2: GO TO 1050
1020 PRINT AT x,y;" C ": BEEP 0.
1,10: FOR n=x-1 TO x-5 STEP -1:
PRINT AT n,y+1;"D";AT n+1,y+1;"
": BEEP 0.05,20-n: NEXT n
1025 LET x=n+1
1030 RETURN
1050 PRINT AT x,y+1;"C": PAUSE 2
: FOR n=x-1 TO x-3 STEP -1: PRIN
T AT n,y+1;"D";AT n+1,y+1;" ": B
EEP .05,20-n: NEXT n
1055 PRINT  INK 7;AT n+1,y+1;"D"
1060 BEEP 0.1,10
1070 FOR k=n+2 TO x: PRINT AT k,
y+1;"H";AT k-1,y+1;" ": BEEP 0.0
5,20-k: NEXT k
1072 PRINT  INK 6;AT K-1,Y+1;"E"
1075 LET e$="E"
1080 RETURN
1100 REM FINISH
1110 PRINT AT x,y+1;"C": PAUSE 2
: FOR n=x-1 TO x-3 STEP -1: PRIN
T AT n,y+1;"D";AT n+1,y+1;" ": B
EEP 0.05,20-n: NEXT n
1115 PRINT AT 0,PO;"I";AT 1,PO;"
J": FOR N=1 TO 10: BEEP 0.1,N: N
EXT N: FOR N=20 TO 0 STEP -2: BE
EP 0.1,N: NEXT N
1120 GO TO 325
8010 LET m$="©     ©©© ©©©      © ©
©©© ©©©"
8012 LET n$="©     © © ©        © ©
© © © ©"
8014 LET o$="©     © © © © ©© ©©©
© © ©©©"
8016 LET p$="©     © © © ©      © ©
© © ©  "
8017 LET q$="©©© ©©© ©©©        © ©
©©© ©  "
```

```
8020 FOR m=27 TO 2 STEP -1
8025 BEEP 0.01,m
8030 PRINT  INK 1;AT 4,m;m$( TO
28-m); INK 2;AT 5,m;n$( TO 28-m)
; INK 3;AT 6,m;o$( TO 28-m); INK
 4;AT 7,m;p$( TO 28-m); INK 5;AT
 8,m;q$( TO 28-m)
8040 PAUSE 2: NEXT m
8045 FOR j=1 TO 3
8050 FOR n=1 TO 6: INK n: PRINT
AT 4,2;m$;AT 5,2;n$;AT 6,2;o$;AT
 7,2;p$;AT 8,2;q$
8055 BEEP 0.01,n+10+(j*2): NEXT
n
8056 NEXT j
8060 PRINT AT 12,6; INK 7; BRIGH
T 1;"BY C.M.GIBBS  1983"
8070 PAUSE 100
8080 CLS
8090 REM RULES
8100 PRINT AT 2,2; INK 7; BRIGHT
 1;"5: LEFT";AT 4,2;"8: RIGHT";A
T 7,2;"0: JUMP";AT 12,0;"DODGE T
HE GAPS, REACH THE RINGS ";'';"
  AND DON'T GET KNOCKED OUT !"
8110 PRINT  FLASH 1;AT 21,3;"WAI
T ONE MOMENT PLEASE"
9000 REM GRAPHICS
9010 FOR n=0 TO 7: READ a: POKE
USR "a"+n,a: NEXT n
9020 DATA 28,28,8,63,40,14,82,35
9030 FOR n=0 TO 7: READ a: POKE
USR "b"+n,a: NEXT n
9040 DATA 28,28,9,254,24,232,136
,12
9050 FOR n=0 TO 7: READ a: POKE
USR "c"+n,a: NEXT n
9060 DATA 68,186,185,82,60,199,6
6,36
9070 FOR n=0 TO 7: READ a: POKE
USR "d"+n,a: NEXT n
9080 DATA 28,28,8,62,85,85,20,11
9
9090 FOR n=0 TO 7: READ a: POKE
USR "e"+n,a: NEXT n
9100 DATA 0,6,2,18,18,210,222,25
4
9110 FOR n=0 TO 7: READ a: POKE
USR "f"+n,a: NEXT n
9115 DATA 0,0,0,12,24,40,196,3
9120 FOR n=0 TO 7: READ a: POKE
USR "g"+n,a: NEXT n
9130 DATA 66,66,66,66,231,165,23
1,0
9140 FOR n=0 TO 7: READ a: POKE
USR "H"+n,a: NEXT n
9150 DATA 195,36,24,146,254,16,5
6,56
9160 FOR n=0 TO 7: READ a: POKE
USR "I"+n,a: NEXT n
9170 DATA 66,66,66,66,231,231,23
1,130
9180 FOR n=0 TO 7: READ a: POKE
USR "J"+n,a: NEXT n
9190 DATA 186,186,254,16,56,68,6
8,198
9200 FOR n=0 TO 7: READ a: POKE
USR "K"+n,a: NEXT n
9210 DATA 28,28,255,8,15,241,0,0
9500 REM STRINGS
9510 DIM a$(31): DIM b$(31): DIM
 c$(31): DIM d$(31)
9515 IF game=1 THEN  LET b=1+INT
 (RND*3): GO TO 9520
9517 FOR b=1 TO 3
9520 FOR n=1 TO 31
9530 LET r=INT (RND*6)
9540 IF r=2 THEN  LET HOLE=1: GO
 TO 9548
9545 IF b=1 THEN  LET a$(n)="©":
 GO TO 9551
9546 IF b=2 THEN  LET b$(n)="©":
 GO TO 9551
9547 IF b=3 THEN  LET c$(n)="©":
 GO TO 9551
9548 IF b=1 THEN  LET a$(n)=" "
9549 IF b=2 THEN  LET b$(n)=" "
9550 IF b=3 THEN  LET c$(n)=" "
9551 NEXT n
9552 IF HOLE=0 THEN  LET A$(1)="
 ": LET B$(1)=" ": LET C$(1)=" "
9553 LET HOLE=0
9555 IF game=1 THEN  CLS : GO TO
 9600
9560 NEXT b
9565 LET d$="© ©©©©©©©©©©©©©©©©
©©©©©©©©©©©©"
9570 PRINT AT 21,3; FLASH 0;"
  PRESS ANY KEY         ": PAUSE 0
9575 CLS
9600 LET Z$="E": FOR M=31 TO 1 S
TEP -1
9610 PRINT  INK 6;AT 5,M;a$( TO
32-M);AT 10,0; INK 3;b$(m TO );A
T 15,M; INK 4;c$( TO 32-M); INK
7;AT 20,0;d$(m TO )
9615 PRINT  INK 5;AT 21,0;Z$
9616 LET Z$=Z$+"E"
9620 NEXT M
9625 PRINT AT 19,11;"D"
9630 LET po=2+INT (RND*27): PRIN
T AT 0,po; INK 6; BRIGHT 1;"G"
9640 INPUT "ENTER DIFFICULTY  (1
/2/3) ";D
9645 IF d<>INT d OR d<1 OR d>3 T
HEN  GO TO 9640
9650 GO TO 12
```

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INTERFACE PUBLICATIONS

We're the experts!

Budding Beethovens begin here with Lancastrian J W Casson's 16K computer composer program.

Although limited, this program will provide plenty of scope for creative musicians to write and play melodies of the kind usually played on flute, tin whistle etc.

The two biggest limitations are:

1. You can only play one note at a time and
2. You cannot play slurred notes (due to the first limitation)

Perhaps readers with sound boxes and 48K machines can adapt the program to overcome these problems. However, the main purpose of the program is to allow musical input into any Spectrum using standard musical notation.

Operation

● KEY — To tell the computer which note to play — sharp or flat. The computer will first ask "Sharps ?" and expect to enter, one by one, the letters of the notes to be played sharp or, if none, just press ENTER.

Next the computer will ask "Flats ?" and expect the letters of the notes which it must play flat, again press ENTER if there are none.

● **TIME SIGNATURE** — To tell the computer how many beats there are in a bar.

When playing the tune the first note in each bar is played slightly longer than it's written value to emphasise the note. After the key inputs have been completed the computer will prompt "Time as a fraction". Enter the required time, 3/4 for a waltz, 3/8 for a jig, 4/4 for common time etc. The screen should now look like fig.1.

● **CHARACTER SELECT** — The musical characters of the tune can now be entered, the options are:

REST	— a period of silence
FLAT NOTE	— a note 1 semitone below key note
NOTE	— a note played as written in the key
SHARP NOTE	— a note 1 semitone above key note

Normally the NOTE flag will flash.

All the options can only be selected from the NOTE mode, to select REST hold R until the indicator flashes, to get back to NOTE mode from REST hold key N.

To select SHARP or FLAT hold down S or F as required, to canncel these hold down the opposite key to the option in force, ie. if in sharp mode hold key F to cancel.

● **DURATION** is selected by moving the duration cursor by using the 6 and 7 keys to move it up and down the menu. When the correct duration has been chosen press enter. If the character is a REST then it will be drawn and the computer returns to character select mode.

● **PITCH** selection — a cursor will now appear by the side of the stave and this can be moved up and down again by using the 6 and 7 keys until you reach the position you require. When you press ENTER the correct note will be drawn in position on the stave and the computer will return to character select mode.

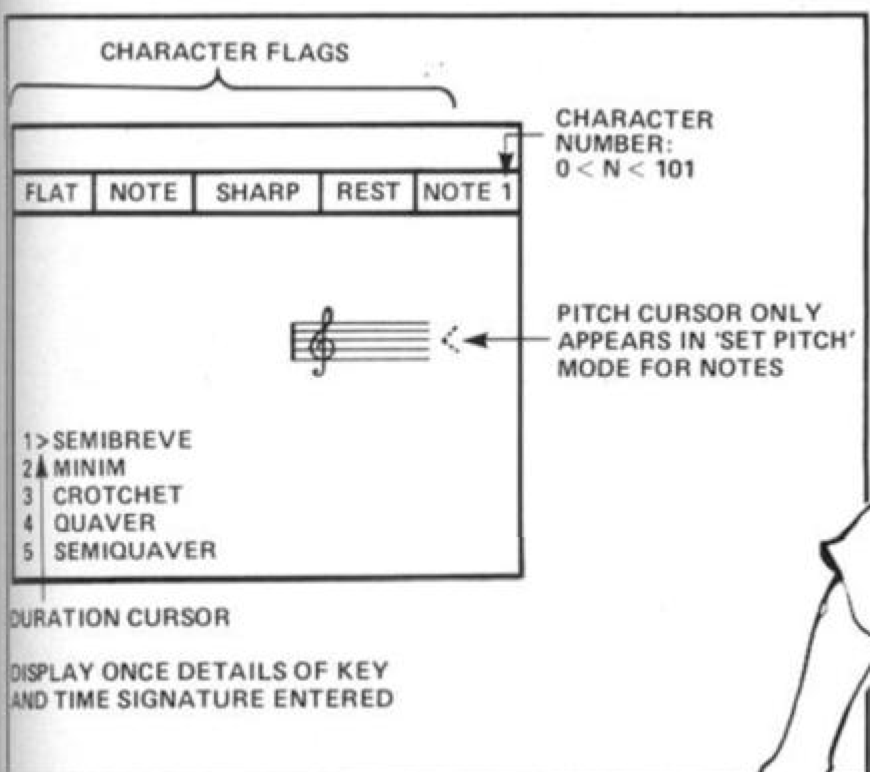
While in the character select mode you also have the following options:

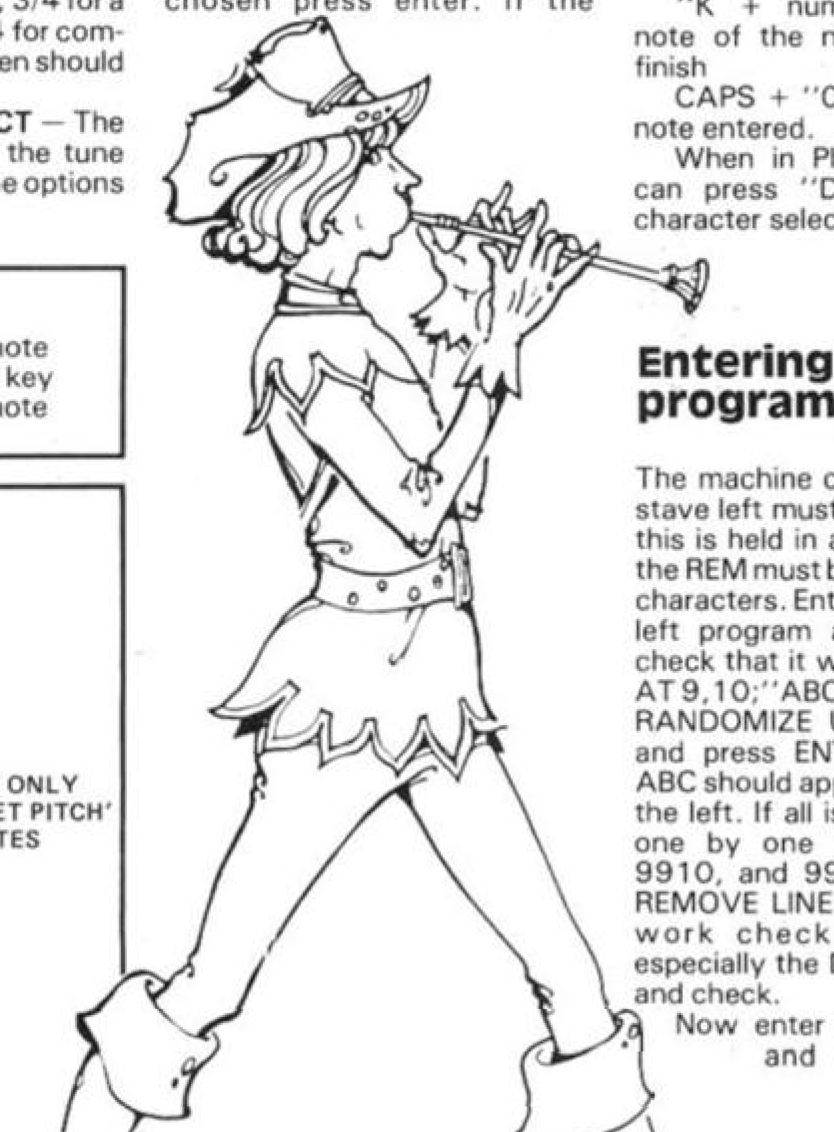
"P" Play tune from start to finish.

"K + number" List from note of the number given to finish

CAPS + "0" Delete the last note entered.

When in PITCH select you can press "D" to return to character select mode.





Entering the program

The machine code to scroll the stave left must be entered first, this is held in a line 1 REM and the REM must be followed by 32 characters. Enter the short scroll left program and RUN it. To check that it works type PRINT AT 9,10;"ABC":FOR i = 1 to 9: RANDOMIZE USR sc: NEXT i and press ENTER, the letters ABC should appear and move to the left. If all is OK then delete one by one lines 2, 9900, 9910, and 9920 — DO NOT REMOVE LINE 1 ! If it doesn't work check the program especially the DATA and re-run and check.

Now enter the main listing and let loose your musical talent.

Minstrel.

Program notes

1	USR machine code routine to scroll the centre of the screen (lines 8u-15) left
2-160	Initialise variables, set Caps Lock on.
300-370	Character input loop
400-490	Pitch select input loop
500-550	Draw note, scroll screen left
1000-1230	Input sharps, flat and time sig.
1500-1509	Draw start of stave & treble clef
1510-1541	Draw lines of stave
2010-2500	Compile tune into beeps and pauses
2500-2530	Play tune
3000-3099	Coordinates for drawing rests, notes, bar lines etc.
4000-4060	Draw Rest, scroll left
8500-9000	Coordinates listing of tune
9000-9560	Draw note/rest subroutines

Variables

Tim	— No. of whole notes in a bar
BA	— No. of whole notes currently in the bar
T(4,100)	— Contains tune data as follows:
T(1,100)	— Note or rest type and
T(2,100)	— Pitch of note — both as entered by the operator
T(3,100)	— Actual note or rest length and
T(4,100)	— Actual pitch of note — both as compiled
N(1,19)	— Data to convert number to beep statement
S$(100)	— Control characters — Sharps, flats and barlines
R	— Rest binary variable
S	— Sharp binary variable
F	— Flat binary variable
L	— Points to current character
C	— Cursor variable
FNI	— Converts INKEY$ to var. C
FNB	— Converts note type to duration of beep
FNP	— Converts T(2,L) to screen coordinate

Scroll left Program

```
   1 REM .......................
.........
   2 LET sc=PEEK 23635+256*PEEK
23636+5
9900 FOR n=0 TO 30
9910 READ byte: POKE sc+n,byte:
NEXT n
9920 DATA 1,0,8,17,0,72,33,1,72,
237,176,6,64,62,0,17,32,0,33,31,
72,119,237,90,16,251,201
```

MINSTREL listing

```
   2>POKE 23658,8::INK 0:PAPER 7
:BRIGHT 0:CLS :DIM S$(100):LET S
=0:LET F=0
   3 POKE 23676,255
  13 DEF FN I(C,L,H)=C+(INKEY$="
6")*(C<H)-(INKEY$="7")*(C>L)
  25 DEF FN P(X)=50+2*X
  30 LET SC=PEEK 23635+256*PEEK
23636+5
 100  DIM N(19)
 110 DIM T(4,100): LET L=1
 130 GO SUB 1500
 131 LET R=0
 132 LET BA=0
 133 DEF FN B(T)=2/2^T
 135 RESTORE
 140 FOR N=1 TO 19: READ C
 150 LET N(N)=C
 160 NEXT N
 170 DATA -5,-3,-1,0,2,4,5,7,9,1
1,12,14,16,17,19,21,23,24,26
 180 LET C=1: LET OC=C: LET OPC=
1: LET PC=OPC
 190 GO SUB 1000
 301 LET R=0: LET E=L
 310 PRINT #0;AT 1,0;" 1   Semibr
eve                   2   Minim
                      3   Crotch
et                    4   Quaver
                      5   Semiqu
aver"
 320 PRINT #0;AT C,0;">": OVER 0
 321 BRIGHT 1: PRINT AT 3,0; FLA
SH F;"FLAT "; FLASH NOT R;" NOTE
 "; FLASH S;" SHARP "; FLASH R;"
 REST "; FLASH 0;":NOTE ";L: BRI
GHT 0
 322 LET F=(NOT R) AND ((INKEY$=
"F" AND S=0) OR ((F AND INKEY$<>
"S"))) : LET S=NOT R AND (((INKE
Y$="S" AND F=0) OR (S AND INKEY$
<>"F")))
 330 IF INKEY$=CHR$ 13 AND BA+FN
 B(C)<=TIM THEN  LET T(1,L)=C: B
EEP .1,-30: LET BA=BA+FN B(C): L
ET S$(L)=CHR$ ((128*(BA=TIM))):
LET BA=BA*(BA<TIM): GO TO 400+36
00*R
 331 IF INKEY$="K" THEN  INPUT "
LIST ";NL: LET L=NL: LET E=100:
GO SUB 8500: GO TO 300
 332 IF INKEY$=CHR$ 12 THEN  LET
 L=L-1: LET BA=BA-FN B((T(1,L))-
10*(T(1,L)>10)): LET BA=BA+TIM*(
BA<0): BEEP .1,-30: LET T(1,L)=0
: LET S$(L)="": GO TO 300
 333 IF INKEY$="P" THEN  GO SUB
2000: GO TO 300
 334 LET R=((INKEY$="R") AND (R=
0)) OR (R=1) AND (INKEY$<>"N")
 340  LET C=FN I(C,1,5): IF OC<>
C THEN  BEEP .05,-30: PRINT #0;A
T OC,0; OVER 1;">": LET OC=C
 370 GO TO 320
 401 OVER 1
 402 LET S$(L)=CHR$ (CODE S$(L)+
50*S+51*F)
 410 PLOT 250,88-PC*2: DRAW -2,2
: DRAW 2,2
 420 LET PC=FN I(PC,1,19)
 425 IF INKEY$=CHR$ 13 THEN  GO
TO 470
 430 IF OPC<>PC THEN  BEEP .05,-
```

```
30: OVER 1: PLOT 25Ø,88-OPC*2: D
RAW -2,2: DRAW 2,2: LET OPC=PC:
GO TO 41Ø
 435 IF INKEY$="D" THEN  PLOT 25
Ø,88-2*PC: LET BA=BA-FN B(T(1,L)
): LET BA=BA+TIM*(BA<Ø): DRAW -2
,2: DRAW 2,2: GO TO 3ØØ
 46Ø GO TO 42Ø
 47Ø PLOT 25Ø,88-PC*2: DRAW -2,2
: DRAW 2,2: LET T(2,L)=2Ø-PC
 48Ø OVER Ø: GO SUB 151Ø: REM DR
AW STAVE
 49Ø RANDOMIZE USR SC
 5ØØ LET LI=L: GO SUB 3ØØØ
 55Ø LET L=L+1: GO TO 3ØØ
1Ø1Ø INPUT "SHARPS ?"; LINE I$
1Ø2Ø IF I$="" THEN  GO TO 11ØØ
1Ø3Ø LET S=(CODE I$)-63
1Ø45 IF I$="G" THEN  LET N(1)=N(
1)+1
1Ø6Ø FOR M=1 TO 19
1Ø7Ø IF (M=S) OR (M=S+7) OR (M=S
+14) THEN  LET N(M)=N(M)+1
1Ø75 NEXT M
1Ø9Ø GO TO 1Ø1Ø
11ØØ REM INPUT FLATS
111Ø INPUT "FLATS ?"; LINE I$
1115 IF I$="" THEN  GO TO 12ØØ
113Ø LET S=(CODE I$)-63
115Ø IF I$="G" THEN  LET N(1)=N(
1)-1
116Ø FOR M=1 TO 19
117Ø IF (M=S) OR (M=S+7) OR (M=S
+14) THEN  LET N(M)=N(M)-1
118Ø NEXT M
119Ø GO TO 11ØØ
121Ø INPUT "Time as a fraction "
;tim
122Ø LET S=Ø
123Ø RETURN
15ØØ REM 1ST STAVE
15Ø1 GO SUB 151Ø: OVER Ø: DRAW -
8,Ø: DRAW Ø,-16
15Ø2 RANDOMIZE USR SC: GO SUB 15
1Ø
15Ø3 PLOT 238,58: DRAW 4,Ø,PI: D
RAW Ø,27: DRAW 2,4,PI/12: DRAW 2
,-4,-PI/1Ø: DRAW -4,-7: DRAW Ø,-
15,PI/1.2: DRAW 1,12,PI: FOR R=Ø
 TO 2: GO SUB 151Ø: RANDOMIZE US
R SC: NEXT R
15Ø9 GO SUB 151Ø: RETURN
151Ø FOR N=Ø TO 4
152Ø PLOT 239,62+4*N
153Ø DRAW 8,Ø
154Ø NEXT N
1541 RETURN
2Ø1Ø INPUT "TIME FOR MINIM ";T
2Ø2Ø FOR N=1 TO L-1
2Ø24 IF T(1,N)=Ø THEN  LET L=N:
GO TO 25ØØ
2Ø25 IF T(1,N)>1Ø THEN  LET T(3,
N)=1ØØ/2^((T(1,N)-1Ø)): GO TO 2Ø
5Ø
2Ø3Ø LET T(3,N)=T*2/(2^(T(1,N)))
+T/2Ø*((S$(N-(N>1))<CHR$ 128))
2Ø4Ø LET T(4,N)=N(T(2,N))+(S$(N)
="2" OR S$(N)="SIN ")-(S$(N)="3"
 OR S$(N)="COS ")
2Ø5Ø NEXT N
2499 PRINT #Ø;"TUNE COMPILED PRE
SS ANY KEY": PAUSE Ø
25ØØ FOR N=1 TO L
251Ø IF T(1,N)<1Ø THEN  BEEP T(3
,N),T(4,N): NEXT N
2511 PAUSE (T(3,N)+1)
252Ø NEXT N
253Ø RETURN
3ØØ1 LET S=Ø: LET F=Ø
3Ø1Ø GO SUB 151Ø
3Ø15 LET R=Ø: IF T(1,L)>1Ø THEN
 LET R=1: LET T(1,L)=T(1,L)-1Ø
3Ø17 IF S$(L)="2" OR S$(L)="SIN
" THEN  PRINT AT 15-(T(2,L)/4),2
8;"#": LET S=1
3Ø18 IF S$(L)="3" OR S$(L)="COS
" THEN  PRINT AT 15-(T(2,L)/4),2
8;"b": LET F=1
3Ø2Ø GO SUB 9ØØØ+1ØØ*T(1,L)+5Ø*R
3Ø3Ø REM NOTE ABOVE OR BELOW STA
VE
3Ø39 IF R THEN  GO TO 3Ø8Ø
3Ø4Ø IF T(2,L)>15 THEN  PLOT 235
,82: DRAW 8,Ø
3Ø5Ø IF T(2,L)>17 THEN  PLOT 235
,86: DRAW 8,Ø
3Ø6Ø IF T(2,L)<5 THEN  PLOT 235,
58: DRAW 8,Ø
3Ø7Ø IF T(2,L)<3 THEN  PLOT 235,
54: DRAW 8,Ø
3Ø8Ø RANDOMIZE USR SC
3Ø9Ø  FOR J=5+(S$(L+1)="3" OR S$
(L+1)="SIN " OR S$(L+1)="2" OR S
$(L+1)="COS ") TO T(1,L) STEP -1
: GO SUB 151Ø: RANDOMIZE USR SC:
 NEXT J
3Ø91 IF CODE S$(L)>=128 THEN  PL
OT 24Ø,62: DRAW Ø,16: GO SUB 151
Ø: RANDOMIZE USR SC
3Ø92 IF R THEN  LET T(1,L)=T(1,L
)+1Ø: LET R=Ø
3Ø99 RETURN
4Ø38 LET T(1,L)=T(1,L)+1Ø
4Ø39 GO SUB 3ØØØ
4Ø4Ø LET L=L+1
4Ø6Ø GO TO 3ØØ
8Ø21: IF T(2,L)>18 THEN  PLOT 23
5,9Ø: DRAW 8,Ø
```

```
85ØØ REM LISTN,E
851Ø RANDOMIZE USR SC: GO SUB 15
ØØ: REM TREBLE CLEF
852Ø FOR X=Ø TO 1Ø
8535 LET L=X+NL
8537 IF T(1,L)=Ø OR L>E THEN  RE
TURN
854Ø GO SUB 3ØØØ
8576 NEXT X
858Ø IF L<E THEN  LET NL=NL+X: P
RINT AT Ø,Ø;"Scroll?": PAUSE Ø:
PRINT AT Ø,Ø;; OVER Ø;"
 ": GO TO 852Ø
859Ø PRINT BA: PAUSE Ø: RETURN
91Ø1 OVER Ø
91Ø5 LET Y=FN P(T(2,L))
911Ø CIRCLE 239,Y,2
914Ø RETURN
916Ø PLOT 245,7Ø: DRAW Ø,-2: DRA
W 5,Ø: DRAW Ø,1: DRAW -5,Ø: RETU
RN :
921Ø GO SUB 91ØØ
922Ø PLOT 241,Y
923Ø DRAW Ø,11
924Ø RETURN
926Ø PLOT 245,71: DRAW Ø,1: DRAW
 5,Ø: DRAW Ø,-1: DRAW -5,Ø: RETU
RN :
931Ø LET Y=FN P(T(2,L))
932Ø FOR D=Ø TO 2 STEP .5
933Ø CIRCLE 239,Y,D
934Ø NEXT D
9349 PLOT 241,Y: DRAW Ø,11: RETU
RN
936Ø PLOT 245,66: DRAW Ø,4: DRAW
 2,Ø: DRAW -1,3: RETURN :
94ØØ REM QUAVER
941Ø LET Y=FN P(T(2,L))
942Ø FOR D=Ø TO 2 STEP .5
943Ø CIRCLE 239,Y,D
944Ø NEXT D
9449 PLOT 241,Y: DRAW Ø,11: DRAW
 3,-2: DRAW -3,1: RETURN
946Ø PLOT 245,7Ø: DRAW 4,1: DRAW
 -2,-6: RETURN :
951Ø GO SUB 94ØØ
952Ø DRAW Ø,-3: DRAW 4,-1: DRAW
-4,1
953Ø RETURN
956Ø PLOT 245,7Ø: DRAW 4,1: DRAW
 Ø,-2: DRAW 3,1: DRAW -3,1: DRAW
 -2,-6: RETURN
```

Across the Pond

Mark Fendrick is a respected American TS fanatic who will be keeping us informed of the latest USA developments.

Welcome to the first of my reports from the United States. As you may know, Sinclair Research was distributed here under the Timex/Sinclair name. Unfortunately, in February 1984, Timex left the home computer market, leaving thousands of us high and dry, without support. Following Timex's pullout, the major source of information for Sinclair computerists in the USA, Sync magazine, ceased publication.

An American history of Sinclair computers is in order here.

The original Sinclair entry is familiar to you, the ZX-80. Sold only by mail-order through Sinclair Research Ltd., U.S.A., it did not make a big splash, but was truly a wonder for those who were handy with a soldering iron.

The introduction of the ZX-81 followed in 1982, and it was here that I became aware of Sinclair. For $99.95, you could have a fully assembled computer! If you were the do-it-yourself type, you could get the kit for $79.95. Playing on the safe side, I ordered the assembled version in July of 1982. From that point I was hooked.

In the fall, Sinclair announced that Timex, who had been manufacturing the ZX-81, had been licenced to distribute it in North America under the name Timex/Sinclair 1000. It was identical to its European counterpart in all ways but one. For the same $99.95 list price, it would contain 2K RAM.

All Sinclair compatible software and peripherals would work with the T/S 1000. However, the ZX printer which Sinclair had developed could not pass the requirements of the Federal Communications Commission (it put off radio signals which caused radio and TV interference), so Timex contracted Alphacom to produce a printer which would be small, compatible, and the same price as the announced ZX printer. The result was a slightly larger, separately powered unit — the T/S 2040 printer. Most important however, is the fact that it prints black on white thermal paper, as opposed to the silver paper used on the ZX printer. Also, the T/S 2040 is much faster, and quieter. (No longer do I have to hide in the other room if I need a print-out.) You can also get paper that produces blue writing, but that is harder to read, and does not reproduce well.

Inadequate Promotion

Unfortunately, Timex, so good at mass marketing its watches, went into hibernation, and the product fell victim to Timex's failure to promote it properly. While Commodore was touting its new C64, Timex placed very few printed advertisements and only two T.V. commercials. Nowhere was expandability mentioned, even though a number of 64K add-ons were available, as well as Timex's own T/S 1016 16K unit. Even Timex's T.V. spot said that you should get a Timex before you spend a great deal of money on a "real" computer!

About this time Sinclair in the U.K. announced the ZX-Spectrum. We could hardly wait for Timex to come out with the T/S 2000. It was finally shown, looking identical to your now familiar Spectrum. Timex decided, however, to improve upon the Spectrum, and delayed the format introduction. Now scheduled to be the T/S 2016 (16K), and T/S 2048 (48K), they had been updated, and redesigned. The case was now a silver rectangle with a hinged compartment, housing a slot in which to insert the solid state software (Command Cartridges) to be developed. The "chicklet" type of keyboard found on the Spectrum was replaced by the soft-touch, full-size keyboard similar to that of the Brother EP-20 personal printer. Yet, the introduction was further delayed as more improvements were made. Features such as four display modes, ON ERR statements, SOUND (in addition to BEEP) commands to utilize the four channel synthesizer, joystick capacity, bank switching, and an improved LOADing system were added. Now the newly dubbed T/S 2068 had a 16K ROM (differing somewhat from the Spectrum's) an additional 8K (bank switched automatically) to handle the cassette interface, as well as 48K RAM. (The 16K RAM version had been scrapped). The suggested retail price for this was $199.95.

Other Improvements

Also at the same time, Timex was updating the T/S 1000 into what became the T/S 1500. The 2K RAM was replaced with 16K built in. The membrane keyboard was replaced by the keyboard now found on the Spectrum. All this for $79.95.

After lengthy delays, October 1984 saw these computers become available — barely. Although I live in New York City, I had to travel to Boston to attend the first, and only Timex show sponsored by the Boston Computer Society, to get my computer. At that time both Maggy Bruzelius, of Sinclair, USA, and Dan Ross, Vice President of Timex Computer Corporation, stated that Timex was to take an aggressive stance, and fully support consumers and third party suppliers. Also shown but not yet available, were the Timex modem, program recorder, joysticks, a Spectrum emulator, and the long anticipated micro-drive. A full size, letter quality printer was also in the works. However, the support was no better for the T/S 2068, or the T/S 1500, than it was for the 1000, so as the reviews were appearing in the U.S. computer magazines (all agreed that this was a superior computer), Timex was announcing its exit from the computer market.

Now all the peripherals that we looked forward to were not going to be marketed — at least not by Timex. Sinclair said that it had no intention of marketing any of the Timex line, although they were getting ready to introduce the QL here. The support you in the rest of the world get from Sinclair, we never received from Timex. However, in the months following the pullout, many of the peripherals announced by Timex, have indeed become available.

T/S 2068/ Spectrum Compatibility

Much of the Spectrum software may be compatible with the T/S 2068, but there are a few problems. Due to the reorganization of the ROM, machine code software will rarely, if ever, work on the T/S 2068. All basic programs written for the Spectrum will work on the T/S 2068, but there are occasional problems LOADing them from Spectrum tapes. ZX-81 software is, however, compatible with both the T/S 1000, and T/S 1500. I will be investigating software, and will report to the U.S. owners on what is immediately compatible, so here is a chance for you U.K. suppliers to get a foothold into the U.S. If you could forward me a copy of your catalogue, indicating which programs are in BASIC, (along with instructions on how to order from North America), I will compile a list of products. (If you desire to send a test/review copy, I can report on those that I know for a fact work).

I have been informed that both Scrabble and Horace and the Spiders have been tested by Timex, and are known to be compatible. Horace and the Spiders is available in the U.S., but Scrabble is not. When I tried to order from Sinclair in the U.K. I was told that it could not be sent due to distribution agreements with Timex, and I should contact Timex for availability. Come now, Timex negated those agreements, and is importing no software. Please reconsider your position, and allow North American Sinclair owners to order those titles which are known to work on the TS/2068.

Right now ZX Computing is the best resource all Sinclair and Timex owners have, and I thank Ray Elder for thinking of us. I look forward to hearing from you from both sides of the Atlantic. Write to me at: Post Office Box 2392, Secaucus, NJ 07094-0992 U.S.A.

For those of you who are connected to THE SOURCE, my ID # is BCA632.

Mark Fendrick



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Mike and Peter Gerrard are regular contributors to *Which Micro?* and *Personal Computer News*. Peter Gerrard is the author of many titles in the Duckworth Home Computing list, including the Exploring Adventures series, and contributes to *Popular Computing Weekly, Commodore Horizons* and *Micro Adventurer*.

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Readers' Reviews

Opinions from the people who play the games and use the programs the most – yourselves.



Defenda
48K Spectrum
Interstella Software
Mark Tynan

Here's a game for all you arcade game players that suffer from 10p-Nitus (lack of ten pence pieces for your favourite machines!). The game is of course — you guessed it — a take off of "Defender", and a pretty good take off at that. The game features most of the features of the arcade original, including humanoids to be rescued from the grip of the alien Landers, mutants, baiters and other little oddities to ensure sleepless nights. There is even a radar at the top of the screen (as in the original), showing how many little nasties are left to be dealt with as dots.

The action and screen scrolling is fast and smooth, enough to prove a real challenge. The graphics are good, very good in fact. When you rescue a falling humanoid, you see a small "500" whizzing past your ship showing the amount of bonus points you received. Very impressive! There is even **reverse!** All in all the game is quite like the "Real Thing", except for the fact that you can use interface II and Kempston joystick interfaces with the Spectrum version (something you can definitely not do with the arcade version!).

Another little advantage of the Spectrum version is the game produces special codes to verify your high-scores. Hyperspace is no-problem except for the fact that when you use the hyperspace button, you sometimes get materialised onto an alien, which results in an instant ship loss.

The instructions on the inlay card are quite good. There are graphic representations of what the aliens look like in the screen, with the scores for shooting the alien alongside. The only problem is the inlay card instructions assume you know how to play the game Defender already.

My only gripe about this game is that there is no sound during the course of the game, not even the low growl of the engines, or even when you shoot an alien nastie. In fact, the only sound being when a lander takes a humanoid, there is a low series of clicks, and when you go into hyperspace or get killed, there is a sound like something you could make using a FOR-NEXT loop, with a BEEP statement in the middle.

Verdict:
- **Graphics — 75%**
- **Instrucions — 65%**
- **Playability — 85%**
- **Use of Machine — 65%**
- **Value for Money — 80%**

The Train Game
Microsphere
£5.95
John Bourne

Last Christmas the Computer was the in thing for dads to buy their children so they could use it as an excuse to get something they wanted for themselves. Twenty years ago Fathers bought train sets for their sons for the same reason. Now, courtesy of Microsphere you can have the best of both worlds. No longer need one sit with ones legs around the neck as a miniature train weaves its way through make believe tunnels under the lounge chair. Your entire layout appears on the TV screen and, indeed, is far more ambitious than the average model railway enthusiast could afford. This excellent simulation gives one the possible choice of two distinctly different layouts. There are 25 switchable points on track A and 19 on track B. Each layout boasts 3 stations and many other novel additions appear as the game progresses.

There are seven levels, so the instructions inform us, but I have yet to reach them all by progression although one can designate which level at the start of the game. The first six levels have five sub-levels and level 7 offers nine sub-levels.

Now if you think the running of a railway is simple then forget it, for it takes considerable skill and practice even to control the running of a single train. One has to avoid wrongly set points and de-railments due to changing points with the train on them. The disasters are graphically represented on the screen.

There is also the problem of passengers. You have to pick up 25 passengers before progressing to the next sub-level and each passenger scores points providing they are picked up in time. If, However, you keep them waiting they will turn white with anger and score nothing when picked up. Indeed, if there are angry passengers there when the train arrives then only they are allowed on board and all the others must wait. They may well be white with anger by the time you get to that station again. There is another problem that could well arris. You may allow the station to fill up and then you will find yourself in further trouble.

You are allowed three disasters before the railway looks for another General Manager. A high score column keeps a record of your efforts.

You can stop the whole system while you reflect on what to do next but beware, while nothing is happening your score will begin to decrease. Then there is the odd goods train or express that appears on the system and the only way to get rid of these is to send then from whence they came. Care is needed here for if you inadvertantly direct one of your suburban trains along that line it will disappear for ever.

Every so often a turntable bonus appears but whether you consider this is a bonus is a mater for conjecture.

Realistic train noises accompany the screen image but I found them too repetitive to be enjoyable. Fortunately there is a facility for switching them off.

There are many other problems and eventualities built into the program and these are fully explained in the adequate instructions printed on the cassette inset.

All in all, this is an excellent example of what can be done on even the 16K Spectrum and the program is very addictive. It would be interesting to hear of high scores achieved by others.

There are, of course, drawbacks in even the best programs. The letters that designate the points are difficult to see and it would have been very much better if a simple introductory track had been included, with say eight points, to enable the user to get in some practice. I have made copies of both the tracks on a piece of card and lettered the points clearly, This card is left near the computer for reference.

I would thoroughly recommend this game to all Spectrum owners and suggest that at £5.95 it is very good value for money.

Fighter Pilot
Digital Integration & Flight Simulation
Psion
Mark Stoneham & David Wright

Of the many uses the Spectrum can be put to, flight simulators seem to have the most lasting appeal and probably utilise its ►

considerable facilities for memory, colour and graphics more than any other type of commercial software. Two of the best currently available have been produced by two very different software houses: Psion and Digital Integration. The former has many good quality games to its credit whereas the latter has only appeared on the Spectrum scene recently.

Seen on the shelf Psion's Flight Simulator has a considerable and unmistakable head start on Integrations Fighter Pilot as its cover design is a much more eye-catching and tempting piece of printing. The next aspect of the products which is always taken into account is the price; in this case they are both a reasonable £7.95 which should not deter the would-be flying ace.

Documentation is both thorough and precise for the two packages although Fighter Pilot's is slightly superior in that it contains pilot's notes and technical data as well as the usual instructions. The notes give advice on your approach, flaps and undercarriage and informs you of your take-off and stall speed. The aircraft's performance and specifications are dealt with in the Technical Data.

Flight Simulation does not have provision for a joystick although it is possible to use the Kempston device with the aid of a conversion tape. On the other hand, Fighter Pilot can incorporate one of three: Kempston, AGF and Sinclair Interface 2 (as well as the keyboard).

Both programs load in just under four minutes and result in a list of options. In Flight Simulation there are three: In-flight final approach and take off. Having made your choice, you are asked whether you require wind effects or not (the novice should decline as it makes the game considerably harder). Fighter Pilot boasts a more extensive menu containing five options: landing practice, flying training, air-to-air combat practice, air-to-air combat and blind landing. As well as this, you have the choice of cross winds and turbulance, your pilot rating and controls.

The Fighter Pilot instruments, from left to right, are as follows: radar and compass which includes your compass bearing and distance in relation to either one of eight beacons or an enemy bomber, depending on whether or not you are in combat mode. Next comes a digital speedometer beneath which sits the flap extension indicator. In the middle of the panel is the artificial horizon



which shows the roll and pitch angle of your aircraft with respect to the ground. Below this is a linear thrust scale followed by digital altitude and vertical speed indicators. Adjacent to these is the Instrument Landing System (ILS) which doubles as a flight computer. On the far right of your console is the fuel gauge, below which is the undercarriage status indicator (i.e. up or down). Finally comes the ammunition indicator and "kills" so far.

The Flight Simulation instrument panel is somewhat similar but consists almost entirely of dials, which can be confusing when the hands rotate more than once. The controls are from left to right: an ILS below which is a radio altimeter which displays your altitude digitally when it is less than 1,000 ft. Beneath this is an undercarriage status indicator adjacent to which is a flaps indicator. Above this is the airspeed indicator which displays your speed in knots. Next comes the RDF clock. This is the principal instrument in your panel and shows your current bearing and your position in relation to your present beacon. Below this there are three digital locks showing your present beacon, your distance fom that beacon and its bearing in relation to your aircraft. The altimeter comes next and this is a dial with two hands; the longer giving the height in hundreds of feet and the shorter in thousands. Finally there are the fuel and power indicators.

The maps in both programs are very impressive although the Fighter Pilot one is bigger in order to accommodate the much more powerful aircraft. Both maps are wraparound affairs which can be very confusing when crossing from one side to another. The Flight Simulation map covers 12,288 sq. miles and has two runways: club and main. It has seven beacons, one range of hills (1,000 ft high) and three lakes: Orb, Long and Tri. The Fighter Pilot map covers 20,000 sq miles, has two ranges of hills (3,500 & 2,000 ft high), eight beacons and four runways: Delta, Base, Zulu and Tango. Unfortunately, when one displays the map in Flight Simulation, one loses the instrument panel thus making prolonged periods of air borne navigation impossible.

There is no sound in Fighter Pilot and hardly any in Flight Simulation (only when you crash) although I am sure most users would rather sacrifice audial effects for the excellent graphics in both programs.

The object of Fighter Pilot (that is when air-to-air combat has been selected) is to defend the four airfields from destruction by simultaneous enemy bombers which, although of an inferior performance, are capable of devestating effects on both the airfields and your plane. The only aim we could see in Flight Simulation was to educate the user in the art of flying (which it does admirably). However, we would advise the would-be pilot to consult a flying manual if he is seriously considering flying!

Although we have not dealt with Flight Simulation and Fighter Pilot to their full extent we have tried to cover most of the important points. On the whole Fighter gives more satisfaction, even though its landscape graphics are inferior. Its controls seem more responsive and we would like to conclude in saying that although both programs are good, Fighter Pilot is more exciting and thus slightly better than its counterpart.

Wheelie
Microsphere
David Wright
Price: £5.95

As the well-printed documentation will tell you *"in the 48K game 'Wheelie' you have just taken delivery of the fastest thing on two wheels"*; namely the Zedexaki 500. During a quick spin on the road you happen to see a sign saying 'PRIVATE ROAD — no speed limit to brave riders.' Being the hero you undoubtedly are, you enter the sinister driveway only to discover that the gates have shut behind you and that you are imprisoned in a labyrinth of horrifying alleys infested with hedgehogs, kangaroos and terrifying birds (all trained in karate of course). As well as the undesirable fauna there are other dangers in store, such as spectacular jumps (over buses or cars) and bricks which you must 'wheelie' over; not to mention perilous slopes, patches of dangerous ice and unexpected dead-ends. There are only a few petrol stations so you have to watch the revs' a bit while you speed about.

On the screen there is a cross-sectional view of four roads at the most, and these ar connected by steep slopes which can be used by pressing the 'up' or 'down' key, according to whether you wish to travel uphill or downhill. To attain the next level you must first find the 'ghostrider', who will be a few miles of your original starting point, and then race him back to the start. If you succeed in beating him he will tell you a code which allows you to jump to the next level, of which there are five. Although the game is

hard, it provides an excellent challenge to the budding Hell's Angel!

The graphics are fantastic especially if you crash. For example, if you go too fast down a slope the bike will cartwheel and crush you under its fuel-injected engine; and if you go too slowly over a car-jump you will be thrown over the handlebars. At the beginning I found myself crashing on purpose just to see the amazing effects! As well as this there is a good use of colour and a constant engine revving sounds which is very authentic, and adds to the brilliance of this game from Microsphere.

Kempston, Protek or AGF joysticks can be used and if you possess none of these, there is a routine for defining your own keys which is very helpful indeed.

On the whole 'Wheelie' has all the properties of a bestseller and is great value for money. It combines excellent graphics with stunning sound to create one of the best and most addictive games I have ever seen for the Spectrum.



Handicap Golf
Computer Rentals Ltd
Owen Brooker
Price: £5.95

The title is misleading as no handicap is used in this game. The inlay card gives a brief description of the game but the instructions on the program are sufficient in order to play it. The program takes about 5½ minutes to load and you are greeted with the information that the course is 6444 yards and your set of clubs consists of 4 woods, 8 irons, a pitchwedge, a sandwedge and a putter.

Next is seen the course of 18 holes, their par and the distance of each hole. The overall par for the course is 70. The clubs are then shown and the expected distance for each one. There is a wind factor (or slope of green when you get there). This affects the distance and accuracy of your shot. It is displayed by a number between 0 and 9 for the strength of wind and an arrow showing the direction of the wind.

The capacity of the game is for one or two players. You are asked if you want a preview of the course or to start the game. If you ask for a preview the computer will take you through all the holes and their different views. This is not worth seeing as you can see a preview of each hole as you come to it.

When starting a hole, the view is displayed, the amount of yards in the hole, the score taken so far to this hole and the par for the hole. The graphics are good and well laid out showing trees, bunkers and water hazards. Also, if you go off the edge of the screen at either side you are told that you are out of bounds and must take the shot again.

Before each shot you are asked which club you wish to use. This is a simple matter of moving an arrow to the desired club and pressing 'ENTER'. After this, the view is displayed again and you are asked to move the direction indicator up or down taking into account the wind factor. The animated golfer hits the ball, hands the club to the caddie and walks to the ball during which the process of club choosing is repeated until you reach the green.

On the green, a close up is observed and your ball is seen along with the hole. A direction indicator runs round the screen and you have to stop it in line with the hole and your ball. The power is then asked and you move the indicator as high or low as you wish depending on the distance to the hole. This repeats until the ball has been holed. You are then told your score for that hole. You then go to the next hole and repeat the process. At the end of the round the player runs into the clubhouse for a drink but the poor caddie has to go back home! You can then see your card for the course and you are asked if you wish to play again.

This is very good game and the graphics are exceedingly good. The main rules of golf are followed and at £5.95 it is well worth the money. I highly recommend it.

Starfire
Virgin Games
Nigel Stutt
Price: £5.50

I must admit that I would not have gone all out to find and pay £5.50 on it, its front cover not being too eye-catching. But when I received Starfire as a present, I was pleasantly surprised. Its clear, extensive instructions and excellent colour photograph of one of the screen dumps in the game, do a great deal for the user. There is even a condensed list of all control keys used for easy access when playing the game (and I must say, you certainly need it for at least your first ten games). There is also information on the author of the game which is a very good idea as it gives an indication of how long the program took to write, etc.

Once the program has spent four minutes loading (my copy loaded every time) your name is entered and the skill level chosen, of which there are 10. Number one (ZX80 Brain) is supposed to be easy, but I haven't found it easy to complete yet, and level ten is the hardest (impossible is a better word). I am just about up to level two (ZX81 Brain) and I have had the game for two months now!

After this interaction, a data sheet appears, informing the Starship Captain (you) for the number of aliens to kill, starbases to refuel at, and time available to do all of this in.

Eventually, the game starts and the controls provided can be called up from the shipboard computer. Briefly these are:-

- Abort — abort attempt at alien or starbase
- Battlestations — to attack the aliens using keys B,H,F,T and 4 to fire
- Computer Call — calls up a list of controls for the forgetful, damage to ship, or energy distribution
- Dock — to dock with starbase (if you're lucky) for refuelling and repair
- Long Range Scan — to see which are the lucky aliens to be blasted this time or to locate starbases
- Navigate — to move from one subsector to another
- Galactic War Report — shows how many aliens, starbases and stardates (time) remain
- Smart Bombs — the ultimate in weapons, destroys all aliens and starbases in adjacent sectors and usually yourself if you haven't enough power left

The graphics when used are relatively slow with a slow reaction time on the keyboard but this, however, does not make the game any worse as the alien stops moving and firing when the button is pressed. This makes the game easier on level one while still being difficult on level ten as the alien is moving so often that it is usually impossible to get him (it) into your sights.

The game is mostly in 3D but there are a few screens when two dimensional graphics are used. These are when the ship needs to navigate an asteroid field, time portal or dock with a starbase. In these, the ship is seen in 2D as the precision and skill needed would be lost in a third dimension.

The whole program is written in BASIC and is easily listed. The REM statements make the listing easy to understand and I have seen a couple of areas that I have not come across in the game yet, such as a black hole and a self destruct mode. The game runs for over an hour and one disappointment at the end is that no score is employed thus, skill needs to be determined by the amount of aliens destroyed, my total being twenty-one.

In a summary, then, I found the game exciting, strategic and enjoyable though it could be vastly improved with better graphics.

Starfire runs on the 48K Spectrum.

The 80 in 84

Mike Hyams is one of many who still use the ZX80 and here he presents some valuable tips to all it's fans.

Hi there. My name is Zeddy. (What do you mean you've never heard of me? I bet you've never heard of Tim Hartnell either.) Anyway, there I was, waiting for a number 84 databus to come along when all of a sudden this geezer shoves a ZX-printer into my I/O port. Well, I know I've only got a 4K ROM, and there ain't no way that I'm going to get that printer running, when all of a sudden......

I think it would be wise to stick a "But seriously folks" in at this point. Because this article isn't just about interfacing ZX-printers with ZX-80's. It's about the wealth of hardware available, or nearly available, for the 4K ROM ZX-80.

In most peoples eyes the ZX-80 died when the '81 was announced in 1981. At that point there were about 50,000 '80's in Britain alone. Add to that the 65,000 in the USA and the rest of the world and you have a force to be reckoned with. Except, of course, not many people bothered. The ZX-81 and the Spectrum each had an "essential" hardware extra announced at launch. These were the printer and, after a while, the microdrive. The hardware add-ons offered by the independant companies have reflected the quality of Sinclair's own. For example speech, sound, joysticks, and son on. The ZX-80, however, only had a 16K RAM pack as its' extra. Revolutionary as it was then, it hardly compensates the '80 owner of today, who sees so much zap-pow-boom going on around him/her, that a dash to the nearest computer retailer is imminent; if it hasn't happened already.

But do not despair; for help, and hardware, is at hand. I will now make a bold and sweeping statement. At least 50% of ZX-81 hardware will work on a ZX-80. There, I said it. And it didn't even hurt. I'm going to get a bit technical for a couple of paragraphs, so those of you who shudder at the sight of strange words with lines over them can go and amuse themselves with figure 1. By the time you've finished playing with that, us hardware buffs should be finished.

Now then. The words I just referred to above are ROM CS and RAM CS. These are very important to all Z80 based computers, (and more than likely all other computers, but that doesn't concern us). First of all, let us consider the port at the back where you would plug in a RAM pack. If you compare the circuit diagrams of the '80 and the '81, you will find that all but one of the tracks on the port match. Address line one is in the same place on both machines; so is the O volts line; and so on. All except for track 23B, which is on the extreme right underside of the port, looking at if from the front. On the '80 this track is not connected; on the 81 it is the RCM CS line. So what? Well, as you will see, it has an effect on what hardware can be used.

Having established the differences between the two computers we can now move on to Technical Bit number two. (Those of you who are getting a bit bored with all this talk of ports and tracks, try ordering a QL and find out what REAL boredom is all about.) There are two methods of making your Sinclair talk to a hardware add on. One is by using memory locations and the other is by using Input/Output ports. An I/O port is a sort of lateral-thinking version of the memory. If I were to compare a computer to a human being (and who doesn't these days) the computers memory would be like the brain, whereas the I/O would be things like hands, eyes and mouth. As its name suggests, the I/O port is the computers link with the outside world. On the Z80 chip there are 256 of these ports, but some are unavailable for use on the '80. They are used for the keyboard, cassette, and TV, but, fortunately for us, the same ports are used on the '81. Fortunately because this means that any hardware designed for the I/O port on the 81 should work on the '80.

```
  10 PRINT ,"REACTION TESTER"
  20 PRINT
  30 PRINT "WHEN PROMPTED PRESS
N/L. AFTER ASHORT PAUSE THE SCRE
EN WILL       RE-APPEAR. PRESS N/L
 AS QUICKLY AS POSSIBLE."
  40 PRINT
  45 LET M1=0
  46 FOR N=1 TO 10
  50 PRINT "PRESS NEW LINE TO CO
NTINUE"
  60 INPUT Z$
 110 CLS
 115 PRINT "ROUND ";N
 120 PRINT "GET READY THEN PRESS
 N/L"
 130 INPUT Z$
 140 LET X=200+RND(400)
 150 FOR M=1 TO X
 160 NEXT M
 170 POKE 16414,0
 180 POKE 16415,0

 190 INPUT Z$
 200 LET X1=PEEK(16414)
 210 LET X2=PEEK(16415)
 230 LET X3=X1+X2*256
 235 PRINT
 240 PRINT "TIME TAKEN = ";X3
 241 PRINT
 250 LET M1=M1+X3
 260 NEXT N
 270 PRINT "PRESS N/L FOR RESULT
S"
 280 INPUT Z$
 300 LET M1=M1*2
 310 LET Z$=STR$(M1)
 320 IF M1>999 THEN LET Z$=TL$(Z
$)
 330 LET M1=M1/1000
 400 CLS
 410 PRINT "AVERAGE REACTION TIM
E"
 420 PRINT
 430 PRINT M1;".";Z$;" SECONDS"
```

"Aha", I hear you cry. And those of you still playing with figure one should come back for Revelation number two. The ZX printer is purely I/O driven. The port it uses, FBh, is well documented in the manual supplied with it. So we turn to figure two. This is a relocatable machine code routine for using the 4K ROM ZX-80 and the ZX printer together, using the equivalent of the COPY command.

As a brief aside, while some of you are rushing out to buy ZX printers, you might consider 16K of RAM. When extra RAM first appeared for the '80 the cost was over £60 for just 3K. 16K packs can now be bought for less than £20. I know that they are made for the 81, but I think you'll find that they work on the '80 as well. I use Sinclairs' '81 rampack and it works perfectly.

To get back to the printer listing; you will notice that the machine code part is in hex. This is more convenient than decimal when a large amount of data is being entered. The second byte of the code, which is the third and fourth characters in string A$, tells the computer how many lines to copy. For a normal screen copy this is set to 23, or 17 in hex. If you would rather use the routine as an LPRINT command, this number can be ▶

reduced. For example to dump just one line to the printer, change the second byte to a l. This is done by either changing th "17" to "01", or by pokeing the relevant memory location with a 1: i.e. if the code is stored from 32,000 onwards then poke 32001 with a 1. This will then COPY the first line on the screen to the printer. To activate the routine just use a USR function. The way figure two is set at the moment, RANDOMISE USR (30000) will produce a screen copy. If you put the code lower down the memory to say, 18000, then a call to that address will activate it.

```
9888 REM
            DO NOT USE "NEW"
          AFTER RUNNING THIS
               PROGRAM

9900 LET A$="16172A0C40C5E5AF5FD
3FBE1DBFB87FADE0830F8E5D57AFE029
FA307A3574E7923FE762824E5CB27876
72607CB14836FCB119FAE4F06087ACB1
11F67D8FB1F30FB7CD3FB10F1E118D5D
6FB1F30FB7A0FD3FBD11CCB5B28B1C11
520AA3E04D3FBC1C9"
9910 LET X=30000
9920 POKE X,CODE(A$)*16+CODE(TL$
(A$))-476
9930 LET X=X+1
9940 LET A$=TL$(TL$(A$))
9950 IF A$="" THEN STOP
9960 GO TO 9920
```

For machine code freaks, I can tell you that this routine can be adapted to produce hi-res graphics on the printer. I won't tell you how, but I'll give you a clue. The ZX-80 character set starts at 3584 (or 7 × 512) and the pointer is stored in register H, so if you can find the instruction LD H,7 then you're halfway there. The rest is up to you (unless Ray gets lots of leters, in which case I may explain further. Never let it be said that *ZX Computing* doesn't make you think.).

We now know enough about the I/O port to say that ALL I/O mapped products should work on the '80. After the printer and RAM pack, the most popular extras would appear to be speech and sound. A quick flick through the pages of this mag should produce two or three adverts for these on the '81. If you are interested in purchasing one of these for your '80 then check with the manufacturer first, to see if it is I/O or memory mapped. Remember, if it is memory mapped it will probably have a connection to the ROM CS line which isn't connected, so it more than likely won't work.

Two units for the '81, ZXM and ZXS, made by Timedata, ARE I/O mapped and DO work on the '80. These are sound (music) and speech synthesizers, but unfortunately Timedata has withdrawn them from sale, probably due to lack of demand, although the official reason is . . . "No reason". It might be worth giving them a call just in case they still have a few in stock, as they were fine products. Alternatively, there are others still on sale. The Chatterbox from William Stuart Systems is also I/O mapped (or it was last time I looked) as is the ZONX-81 from Bi-pak. These units, speech and sound respectively are still available, and could well extend your ZX-80 beyond what you thought possible. There are others, such as the Cheetah Sweet Talker, but I'm afraid I haven't had time to check what type of mapping is used.

One point to bear in mind when using these I/O units is how you are actually going to program them. Because they are I/O, you have to use the instructions IN and OUT. After a series of finger stretching exercises you can get to these in Spectrum Basic, but on the '80 and '81 they are only available via machine code. Most, if not all, the above products come supplied with instructions on how to do this, but it will require some effort to implement these if you haven't used m/c before. You could always ask a friend.

While browsing through the ads, looking for things to hand on the end of an '80, I came across two items that could be placed inside the case. The first is from P.V. Tubes and appears to be a 8K ROM chip. Those of you hankering after string-slicing and real numbers (but not SLOW) might like to give them a call. The other chip is a Forth ROM from David Husbands' Skywave Software. This may or may not work on the '80 because of the lack of SLOW hardware. Again, a phone call should clear things up.

Before we leave the subject of I/O, a quick mention of Maplins I/O port. For those of you who want to control your central heating or perhaps run Fulham Power Station, this could be what you've been looking for.

My next few notes are, I'm afraid, rather hazy. I know the technique, I have read that it works, but I just haven't got the nerve to do it. What I refer to is the ROM CS connection. For those who wish to throw caution to the wind (you fools) here is the theory.

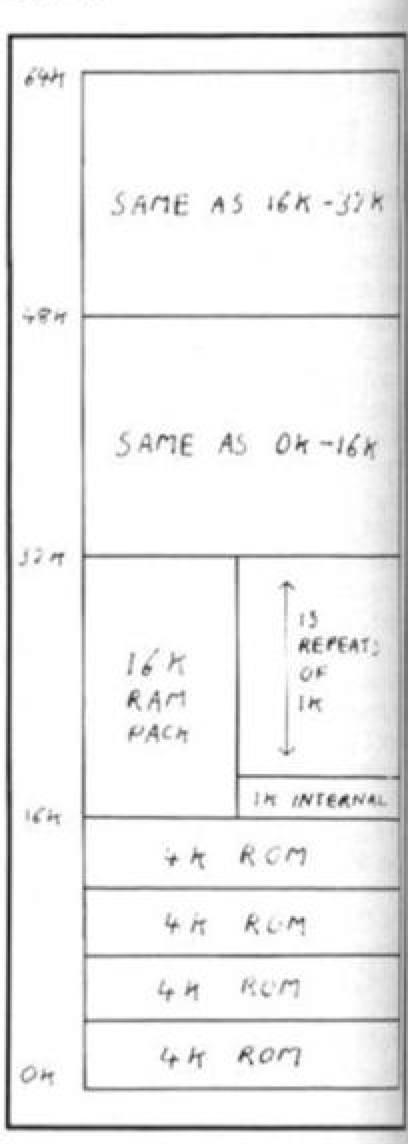
The ROM CS pin must be connected to track 23B. To do this break the track leading to pin 20 of the ROM chip, and put a 680 ohm resistor across the break. Then take a wire from this pin to track 23B on the edge connector. This track should be labelled on the circuit board. This now gives a ROM CS for all add ons. The amount of hardware that can now be used increases significantly with this change. I have not made this connection, but I would be interested to hear from anybody who has, and what they use that takes advantage of it.

If you look at figure 3 you can see how the '80 memory is arranged. It appears that there is more than one ROM, although there is obviously only one. The problem is that the '80 has been built in such a way that chunks of memory keep repeating throughout the memory map. If you want to use an add on that uses part of the memory with a ROM copy in it, then your stuck. Unless you have connected the ROM CS track. This hardware will try to turn off part of the memory, usually the 8K — 16K bank. If the connection is made, the unit should work.

One of the most interesting add ons that utilises the ROM CS line is an EPROM programmer. These are available from, amongst others, Eprom Services and Camel Products. Even if you have moved onto another computer, the possibility of using an old '80 to make your own ROMs' must interest a few of you.

Other peripherals that use the ROM CS track are the range from Memotech. These unit will need some careful inspection before use, as some of them may use ROM calls in the firmware supplied. One Memotech unit that should work is the keyboard. As it uses the I/O method it should be alright, but the legends on the keys will need changing. The DK'tronics keyboard would be just as good, but the wires would need to be soldered in as there are no sockets, the keyboard being part of the circuit board.

On the memory pack side, 32K and 64K RAM packs should work with the aforementioned connection. Quite how you can poke a location greater than 32767 from BASIC I'm not sure, but I expect someone has done it.



Well that just about wraps it up. I hope I have shown you that the ZX-80 is not dead, but merely resting. If you have any problems then call the manufacturer; most are only too pleased to help, and there's usually someone near the phone who knows the technical ins and outs (no pun intended). Or write to me at the Golden Square address and I'll do my best to help.

The program in figure one, by the way, is a little routine that some friends and I nearly used to study the effects of alcohol on reaction speeds. However, we never got round to using it because we were too busy trying out alcohol supplies. Try running the program before and after 10 press-ups. You may be surprised by the results.

If I can convince Ray to give me some space in a future issue I'll go into the mathematical aspect of using your '80. With a litle bit of software, and a little bit more understanding, I'll show you some repetitive floating point maths. Now where did I put my Log tables?

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Programs supplied on cassette with option to Save onto Microdrive (cartridge not supplied)

Existing owners can obtain the new programs by returning the **cassette only** to Picturesque, along with a cheque/PO for **£1.50 per program** (inc. VAT & P&P). New cassettes will be supplied by return of post.

Available from the "SPECTRUM" chain of stores, branches of John Menzies and all good computer shops, or by mail order by sending cheque/PO to:
PICTURESQUE, 6 Corkscrew Hill, West Wickham, Kent, BR4 9BB. Send SAE for details.

PICTURESQUE

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Club corner



Contacts worldwide — consult our club page!

Mid Cornwall ZX Club

Dear *ZX Computing,*
Please give our 'ZX Computer Club' a plug:

Mid Cornwall ZX Club,
CO-OP Rooms,
8, Victoria Road,
Roche,
Cornwall PL26 8JF.
Tel: 0726 890473

We meet Mondays and Friday, 7 to 9pm.

Yours sincerely,
Mike Richards.

Blackburn Computer Club

Dear *ZX Computing,*
I am handling the publicity for the Blackburn Computer Club, which is non-machine-specific Club.

The Club is open to everyone, regardless of age. It doesn't matter if you haven't got a computer of your own. If you are still reading this, then you must be interested a that is all the matters.

You don't need to own a particular brand of computer to join in — at present our members have machines which range through BBC, Atari, Dragon, Spectrum, ZX81 and so on. If you have a computer of any make — or are thinking of buying one — then we'd like to hear from you. We can offer the chance to meet other people with the same or similar interests. The atmosphere at our meetings is friendly and informal, with the accent on enjoyment. If you don't want to talk then there's usually the opportunity to play a game or two. Bring along our own machine to show us if you want — that's what the Club is all about. If you want anything else out of the Club then all we ask is that you tell us.

When you first come along to a meeting, we will ask you for 50p as a cover charge. If you join during the meeting then your 50p will be refunded in exchange for your subscripton. At present the subscriptions are: Juniors — £3 per annum; Adults — £5 per annum; Family — £10 per annum. Once your subscription is paid then there is nothing further to pay to attend normal meetings for the next year. Membership at present stands at about 20, but this is steadily increasing.

The best way to join is to come to a meeting. these are held every other Monday night, at 7.20 pm. at The Fernhurst Hotel, Bolton Road, Ewood. At the bottom of this sheet are the dates of the next three meetings (as at the date of preparing this leaflet).

If you have any queries then please contact any of the following:

Bob Hillyard,
34 Palatine Road,
Blackburn.
or
John Schofield,
1 Sutton Street,
Feniscoules
Tel: 60033 or 28127

FLUSIB

Dear *ZX Computing,*
In the centre of Belgium a new and already flourishing club is born: the **FL**emish **U**sers of **S**inclair **I**n **B**russels (FLUSIB). Already about 25 members meet each other at least twice a month in order to exchange experiences, literature, programs etc. And even guests are welcome!

From October on, every first and third Thursday of each month a new series of free lessons will be given, with the view to give a solid base to all members for their own designing and developing of well structured and correctly running programs. And above all: the club is a non-lucrative one, run in the most efficient possible way by the members itself.

Join it, and write for more details of chairman Erick van-Dyck, Trefcentrum, Dapperheidsplein, 1070 Anderlecht, or phone him (after 19 h.) on (02) 76 76 22 3, or simply try it out by attending a meeting on the first or the third Thursday of the month.

Yours sincerely,

Erick Van dyck
(chairman)

P.S.: thanks for your support by publishing this letter in your ever-interesting magazine's club corner.

Canada ZX

Dear *ZX Computing,*
Talk about a long distance users club!

First to introduce myself, Roelof Mulder (Bob). In essence I am the Administrative officer **and** Editor in Chief of the Timex/Sinclair Users Group Ottawa/Hull Chapter. We hold regular monthly meetings and discuss hardware and software, swap programs, hardware projects and program development. Our group of approximately 50 members cover a range of doctors, lawyers, engineers, public servants and housewives and labourers.

Our interests encompass all aspects of hardware development from small modifications to robotics; software development from business and eductio to game programs and programming from the all pervasive Basic to Forth, Logo,Pascal, Cobol, and the ever mysterious machine language.

In other words, if it has anything to do with Timex/Sinclair, Sinclair computers and products, then we are most interested.

Membership in our group is entirely free and we would be pleased to include your group name as a member of our group. In doing so, you would receive a newsletter whenever they are published, as well as have a forum where in which you may wish to submit comments/reviews/programs/for sale etc.

The only thing we ask is to be members (collectively) of our group. I would appreciate your response, even heaven forbid, to the negative.

Yours sincerely,
R. Mulder.

Turkish delight!

Dear *ZX Computing,*
We would like to inform you that since one year we have a ZX Users Club in operation in Turkey with 740 members. We are publishing a monthly bulletin in Turkish. We are also receiving special discounts for club members from Computer shops for equipment, publications and software.

It would be appreciated very much if you would kindly publish this letter in *news and ideas with other user groups.*

Yours sincerely,
Tuncay Turkeli
Bilgisayar Kulubü
(Bilicag Bilgisayar)
Dunya Saglick Sok Operat Han
41/11 Taksim/Istanbul
Turkey
Phone: 149 16 43/144 52 61

Kempsey contact

Dear *ZX Computing,*
My name is Jason Ellem. I would like to start or join a club in Australia. If there is no club I would like people to write to me at the below address. If there is a club I would like to know about it. So please write to the same address.

Yous sincerely,
Jason Ellem,
148 North Street,
Kempsey, N.S.W. 2440
Australia.

Bookshelf

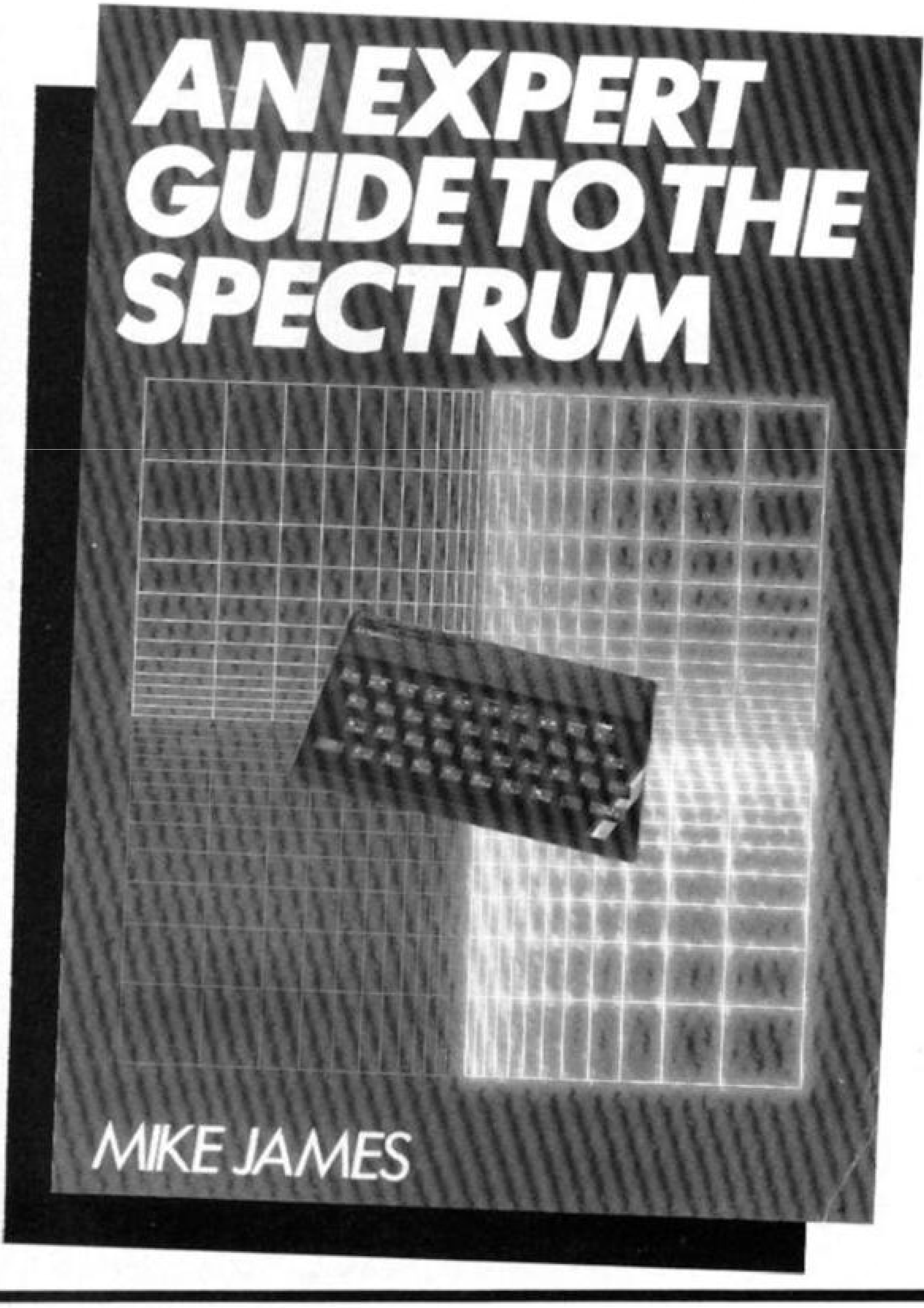
Read all about it with Patrick Cain.

An Expert Guide to the Spectrum — Mike James

If your bookshelves are already almost full of "Instructions to..", "Beginners Courses in.." and other elementary texts for better Spectrum use, then I suggest that you may well find an "Expert Guide to the Spectrum" by Mike James a worthwhile addition to make. Of course books for Spectrum users at all levels proliferate and there is nothing new in books for more advanced reading, but maybe its because this one says what the best part of most of them do that I found it such a good read.

Mike James is the author of several very successful books on programming and many more to come I'm sure. Why am I being quite so generous with the praise? My temperature feels all right. I don't think I need a holiday I must confess I would be getting worried if it wasn't for the blatant fact that Mr. James is a very good writer and deserves any praise — at least for this book, let's not get carried away — that I might lavish.

He doesn't mess around prattling on about this, that and the other before finally making a stab at the topic in question. I get the feeling that he now knows his subject so well that he didn't need to use any notes. His familiarity with the subject shows. As a result the text doesn't labour; moving quickly from point to point while at the same time being aware of the reader and possible areas of difficulty. The text is concise; but accurate and clear and a stimulating read.



1·8 million Spectrum users can't be wrong (figures approx. correct at time of writing i.e. 6.45pm), the Spectrum is a remarkable machine and as such enables programmers to do remarkable thing with it. Logically an investigation of these remarkable features will enable programmers to put them to good use. The reader is required to have no more than a working knowledge of basic to undertake this investigation.

Chapter one, an overview of computer hardware in general, examines busses, addresses, data and bit patterns and effectively establishes the funadmental, relationship that exists between them — Ah! so that's why the highest address is 65535. Chapter two is more specific to the Spectrum, the intention being that a knowledge of the hardware will influence the readers approach to software, and to this end the memory, the video display, input and output devices and the U.L.A. are discussed. Much of the material of the first two chapters is used and developed further in later chapters dealing with more specific topics.

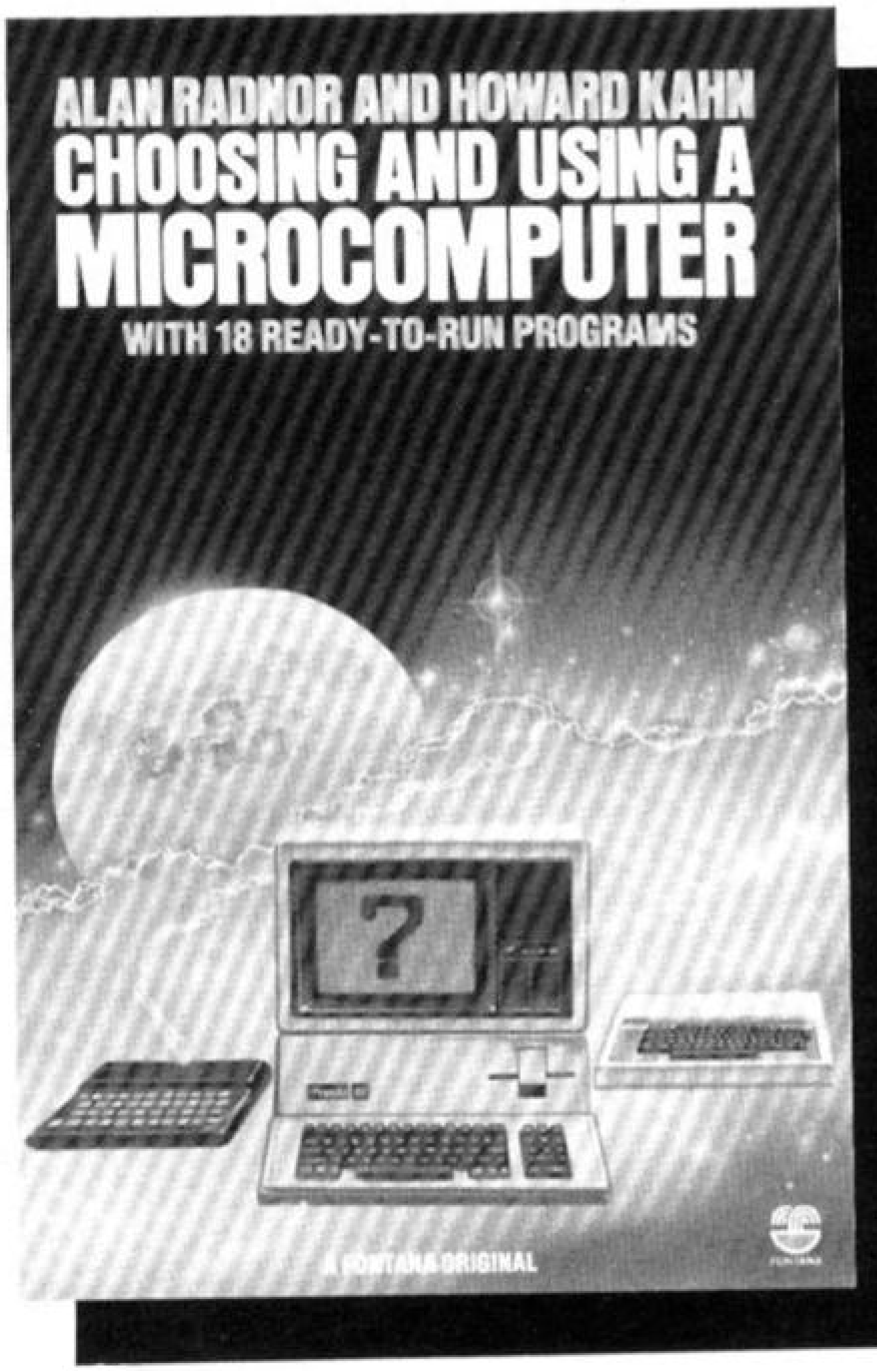
As important as the hardware, the software: the ZX Basic is looked at in chapters 3,4, and 5. In all there are twelve chapters covering the above, the video display, video applications, tape, sound and printer, interface and microdrives, communications and advanced programming applications.

Readers may well have to turn back a few pages sometimes, indeed the author recommends that the reader should read from front to back ▶

and then from back to front. That can only be because of the complexity of the subject and not its treatment on the pages. And even if subsequent readings and necessary then that should require little effort for this is one of the most valuable books I have read this year.

"An Expert Guide to the Spectrum" is written by Mike James, published by Granada and costs £6.95.

ISBN 0-246-12278-1.



Choosing and Using a Micro Computer — Alan Radnor, Howard Kahn

"Choosing and Using a Micro Computer" and not only that but also 18 original programs. Original programs like "Radius", "Patterns", "Compound Interest" and all for £2.50. No I didn't think it was likely either; but what the heck it was a raining Saturday afternoon the type that made you wish it was Monday morning; Oh! and I had a cold as well and apart from darning some socks there was little else to do so I took a brouse through the 140 page Fontana Paperback.

The credits were certainly impressive; Alan Radnor is a journalist and producer of TV computer programmes, Howard Kahn lectures in computing at Manchester Polytechnic. The intentions are valid — "written for everyone who is thinking of buying a computer for the first time and wants to know what it can do, which one to chose, the rudiments of how it works, now to set it up and how much it will all cost" and 18 original programs as well.

Special features includes: a questionaire which tells you at a glance which micro is best suited to your needs, a sample text program to use in the shop, a micro comparison chart showing the capabilities of each make, an explanation of computer jargon and 18 original programs.

There is, I am convinced a need for such a book. Difficult as it is to believe there are still people around who are looking for some basic, commonsense advice on computing and computer buying. The cover notes suggest that "choosing and Using a Micro Computer" might be it. Even on a rainy Saturday, cold and all I was not convinced that the text matched those intentions.

Seventy pages cover who needs a computer, what one is what one can do, setting up the computer and information on software. Seven pages would have done. The text is vague and mostly irrelevant rambling, dated and largely useless.

Am I being too critical, what of the 18 original programs. Any program for someone who doesn't already have a computer must be original. Those of us who do will recognise those listed above and the rest of the 18 O.Ps. to be the same as the ones that would fill these pages and excite us when we were still playing with ZX80's. Why they take up almost half of the book I do not know.

The nicest thing that happened on the rainy Saturday afternoon, and this is original, was having the cold.

"Choosing and Using a Micro computer" is written by Alan Radnor and Howard Kahn published by Fontana and costs £2.50.

ISBN 0-00-036624-4.

The Art of Micro Design — A.A. Berk

"The Art of Micro Design" is one of those 'Text book' books that manages to successfully cross over into the general interest category. Its ability to do that is due to the author's awareness of the difficulty that people have in putting together a sufficient understanding of the workings of a microprocessor.

Maybe I should clarify what I mean by general interest. The book is aimed at engineers and enthusiasts who wish to gain a practical working knowledge of microprocessor system design. Naturally being of general interest it restricts itself to 8 bit microprocessor systems. As you might imagine it amounts to fairly demanding reading; but it is of general interest as it assumes minimum previous knowledge of electronics, while it covers the topics in sufficient detail to allow the reader to design around microprocessor circuits.

I met this fellow recently who lists being a fisherman and a defence systems designer on his C.V. He pointed to the fact that it now wasn't possible for the hobbyist to compete with technology from the kitchen table or anywhere else for that matter. Enthusiasts who have taken technology to where it is today are being forced from their pastimes because of it. I had to agree.

Three hundred consuming pages later I'm not so sure. Using three actual MPU's — the Z80, 6800 and the 1802 — as examples Mr. Berk offers actual data and principles of reading data sheets which could be applied to any MPU. Subsequent discussions on bus structures, memory, input/output devices and interfacing are detailed and supported by examples.

Later chapters develop this new knowledge to consider the use of the micro in computer systems from control and data collection machines to local area networks.

No more is required of the reader than an understanding of logic gates and some general electronic theory. Four appendices offer any further background required and the text provides rather than assumes any more advanced knowledge.

The author manages throughout to convey concepts and principles which are highly theoretical by reference to practical situations and standard hardware. His intention was to enable the reader to have a sufficiently complete understanding of microprocessor design to be practical; in this he has been highly successful.

"The Art of Micro Design" may plant the seed for a whole new crop of micro controlled systems. I shall certainly recommend it to my hobbyist friend, his hitherto frustrated fellow enthusiasts and daunted and bewildered engineers.

"The Art of Micro Design" is written by A.A. Berk and published by Newnes Technical Books.

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Keyboard masks

A simple idea that takes a genius to invent. Enter J L Phillips of Dorset.

Many Spectrum owners have interfaced a joystick with their computer to enjoy playing those games which are suited to such control. Indeed, there is a welcome practice among software houses to produce cassettes which are compatible with available joysticks. However, more and more games are becoming available which are not so obviously suited to joystick control and, as their complexity increases, so does the number of keys which are required to be operated during the course of the game.

A certain amount of manual dexterity is called for, which adds to the interest and entertainment but the need to remember which keys are to be used, and for what purposes, can be tedious, and the continued accessibility of all the unused keys is an unnecessary and sometimes irritating complication.

There are keyboard overlays available, of course, which help in readily identifying the keys in use for a particular game, but these suffer from two disadvantages: first, the remaining keys are still obviously accessible and second, these overlays are designed for use with the standard Spectrum keyboard and not with the typewriter style keyboards in which many Spectrum computers are eventaully housed. Moreover, the distances between the rows of keys on these ''add-on'' keyboards are so small that a simple keyboard overlay would be so flimsy as to be impracticable.

In fact, it is quite feasible to make very functional and effective masks which not only provide quick reference to the control keys but also deny access to the unused keys, removing them from sight and any possibility of confusion.

In the description below, the dimensions are those which I have found suitable for the DK Tronics keyboard but the principle is applicable to any similar unit, the only variation being in readily measureable dimensions. The mask is made up of four basically similar pieces of folded card of postcard thickness. Each piece is formed into the shape of an inverted U section, as shown in Fig 1.

It will be found that these dimensions are such that the card will surround and cover one of the four rows of keys, locating itself at the ends of the keybaord cut-out, resting upon the upper surface of the printed circuit board and with the top face just clearing the tops of the keys. To permit access to particular keys in the row, remove appropriate sections of the card, as shown in the example. When the four pieces, one for each row, have been cut as necessary, they are stapled (or glued) together through the long sides, eg at positions A, B and C. The top surfaces are then labelled to indicate the control functions of the adjacent exposed keys. (I found a combination of Dymolabel on black card to be particularly effective.)

Fig 2 shows a plan view of a mask constructed in this way for use with the game '3D Ant Attack' (Quicksilva).

For games requiring the use of but a few keys, it would be possible to make up the mask from fewer, broader pieces but I favour the user of four pieces nonetheless because of the consequent support given to the mask by its five 'legs' down to the printed circuit board. Although only thin card is used, I have found a mask constructed as described to be quite rigid and serviceable. Use of the device has been most successful, permitting more concentration upon the game itself, thus adding considerably to the enjoyment.

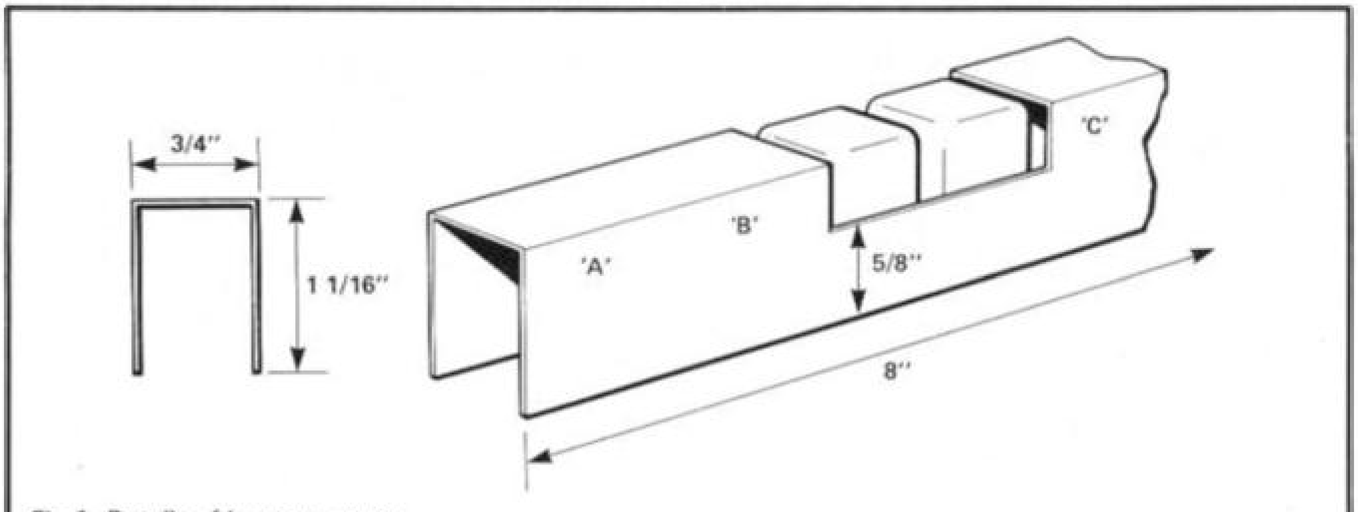


Fig 1. Details of key row cover.

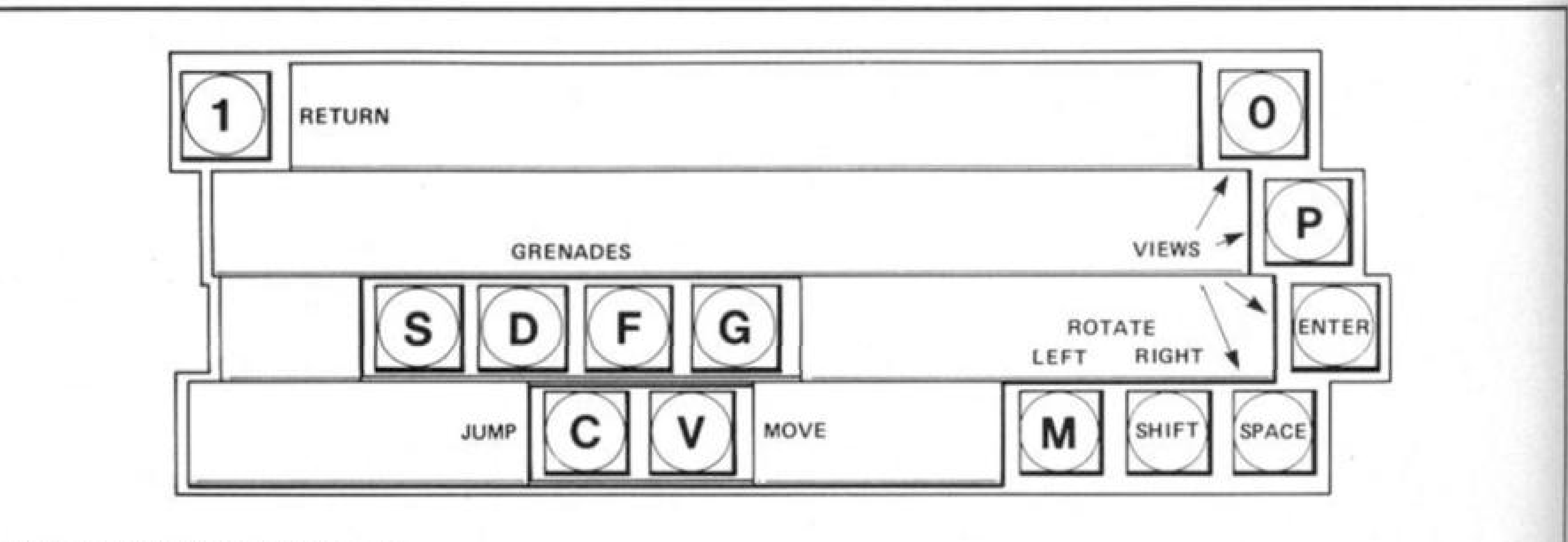


Fig 2. Mask layout for 3D Ant Attack.

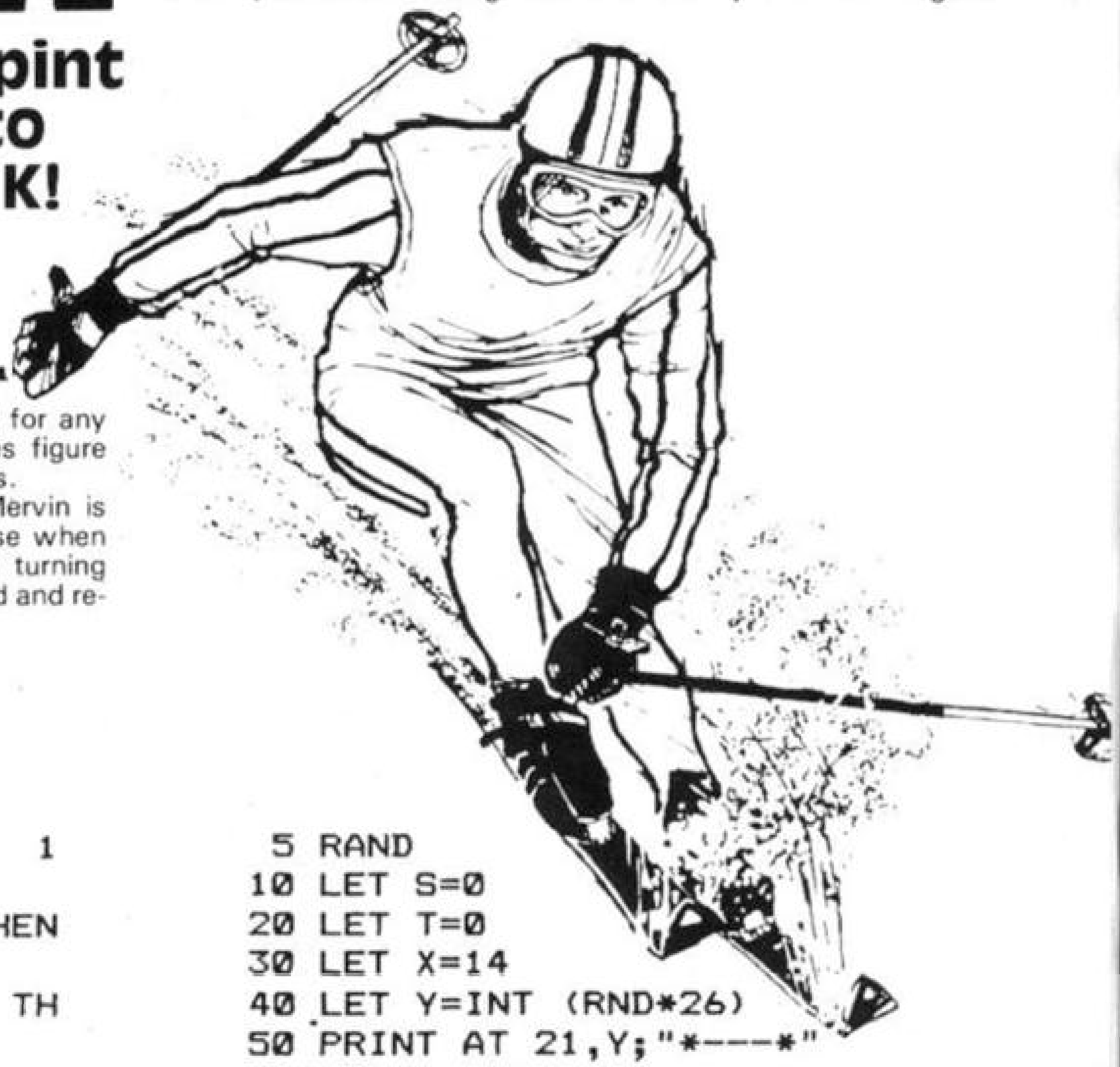
The 1K Corral

Getting a quart into a pint pot is easy compared to getting a program in 1K! A selection of the impossible

Slalom
Andrew Norton

This down-hill skier program works on the ZX81 in 1K and is quite rapid even in slow mode. The object is to move the skier, using the keys "5" and "8", through 20 randomly positioned gates which scroll up from the bottom, without hitting the posts. Your score is given at the end — over 15 is fairly good. To make the game easier the gates can be widened (by altering line 50 slightly) and then changing line 120 to read: IF X = Y + 1 OR X = Y + 2 OR X = Y + 3 etc. etc. depending on how much wider the gate is made.

S is the score, T the number of gates, X the skier's position and Y the position of the gate.



Adding machine
Mervin J Cagle

A useful little program to turn your computer into an adding machine, but what is special is the routine to align the decimals.

This can be utilised for any program which requires figure work involving decimals.

Another tip from Mervin is that you can economise when using this program by turning the printer paper around and re-using it.

```
   1 REM "ADDING MACHINE"
   2 GOTO 60
   3 LET B=0
   6 IF E=0 THEN GOTO 21
   9 LET B=INT (LN (ABS E)/LN  1
0)
  12 IF 1>ABS E AND ABS E>0 THEN
 LET B=0
  15 IF .1>ABS E AND ABS E>=1 TH
EN LET B=-1
  18 IF E<0 THEN LET B=B+1
  20 IF E$="" THEN LPRINT TAB 21
-B;"TOTAL"
  21 IF E=INT E THEN LPRINT TAB
28-B;E;".00"
  23 IF E=INT E THEN RETURN
  25 LET W=10*E-INT ((E*10)+.5)
  27 IF -1E-8<W AND W<1E-8 THEN
LPRINT TAB 28-B;E;"0"
  29 IF -1E-8<W AND W<1E-8 THEN
RETURN
  31 LPRINT TAB 28-B;E
  33 RETURN
  60 LET W=0
  70 LET E=0
  80 LET T=0
 100 INPUT E$
 120 IF E$="" THEN LET E=T
 130 IF E$="" THEN GOSUB 3
 140 LET E=VAL E$
 150 LET T=T+E
 200 GOSUB 3
 300 GOTO 100
```

```
   5 RAND
  10 LET S=0
  20 LET T=0
  30 LET X=14
  40 LET Y=INT (RND*26)
  50 PRINT AT 21,Y;"*---*"
  60 FOR N=1 TO 11
  70 GOSUB 400
  80 SCROLL
  90 SCROLL
 100 GOSUB 400
 110 NEXT N
 120 IF X=Y+1 THEN LET S=S+1
 130 LET T=T+1
 140 IF T=20 THEN GOTO 300
 150 GOTO 40
 300 CLS
 310 PRINT "SCORE ";S;" OUT OF "
;T;
 320 STOP
 400 PRINT AT 0,X;" O "
 410 PRINT AT 1,X;"▗▜▛▖"
 420 PRINT AT 2,X;")█("
 430 PRINT AT 3,X;")█("
 440 IF INKEY$="5" AND X>0 THEN
LET X=X-1
 450 IF INKEY$="8" AND X<28 THEN
 LET X=X+1
 460 RETURN
```

Equations
David Webber

This program can solve equations of the type

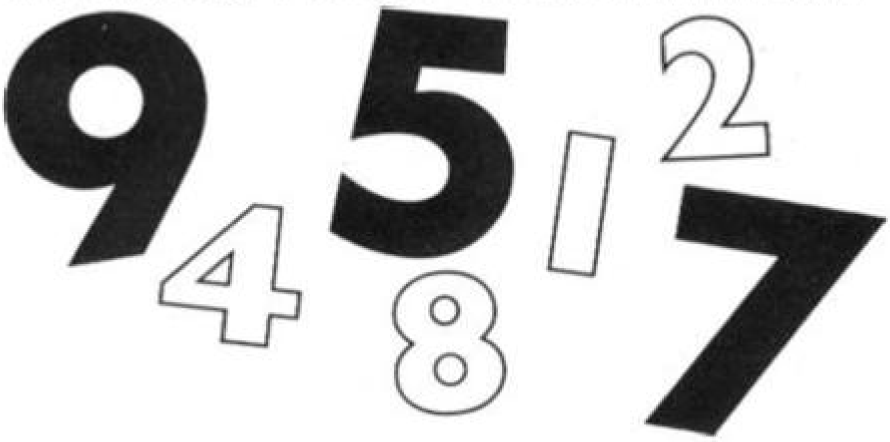
A (x ✱ ✱ b) + C (x ✱ ✱ d) + E(x ✱ ✱ f) = S

providing A,b,C,d,E,f and S are known, by a system of trial and error.

The program starts x at 0 and increases by 1 for each check, once the equation is greater than S then the trial value of x is reduced by one and the trials are started again this time with a increase value of 0.1.

This system is repeated with ever decreasing increments but line 112 limits the accuracy to six decimal places.

If you are dealing in large values then it is possible to alter the value of M in line 2 to accomodate (ie. 10, 100 etc.).



```
   1 PRINT "(A*(X**B))+(C*(X**D)
)+(E*(X**F))=S"
   2 LET M=1
   3 LET M=0
   4 FAST
   5 PRINT "A?"
  10 INPUT A
  15 PRINT "B?"
  20 INPUT B
  25 PRINT "C?"
  30 INPUT C
  35 PRINT "D?"
  40 INPUT D
  45 PRINT "E?"
  50 INPUT E
  55 PRINT "F?"
  60 INPUT F
  65 PRINT "S?"
  70 INPUT S
  71 GOTO 77
  75 LET N=N+M
  76 GOTO 80
  80 LET X=N
  90 LET T=(A*(X**B))+(C*(X**D))
+(E*(X**F))
 100 LET U=(A*((X+M)**B))+(C*((X
+M)**D))+(E*((X+M)**F))
 110 IF T<=S AND U>=S THEN GOTO
124
 112 IF U-T>-.000001 AND U-T<.00
0001 THEN GOTO 140
 115 LET X=N+M
 116 GOTO 75
 128 LET M=M/10
 130 GOTO 80
 140 PRINT "X=";X
```

Jailbreak
Jens Philipp



I have deliberately avoided the scrolling type of game as there are many around which, although clever, seem to be all that people do when writing a 1K game.

The aim of this game is to free as many prisoners as possible. The prisoners — X — are moved from right to left by pressing 1. Patrolling the top of the prison walls are the guards who will catch you if they are above you. However, if you are standing beneath a pillar then the guard cannot see you.

When your man has reached the left hand side of the screen then another starts from the right. The number of prisoners that have escaped is shown in the left corner of the screen.

If you are caught then press newline to restart the game.

```
  10 LET X=PI-PI
  20 LET A$="███████████████████
█████████"
  30 LET B$=" ██  ██  ██  ██  █
█  ██  ██"
  40 LET C$="
          "
  50 PRINT AT VAL "10",VAL "0";A
$
  60 PRINT B$
  70 PRINT AT PI-PI,PI-PI;VAL "4
0"*X,"FREE"
  80 LET N=VAL "28"
  90 LET C$=""+C$( TO VAL "27")
 150 IF RND<PI-INT PI+X THEN LET
C$(VAL "2")="█"
 160 PRINT AT VAL "9" ,PI-PI;C$
 170 LET N=N-(INKEY$="1")
 180 IF N=VAL "3" THEN GOTO VAL
"500"
 190 PRINT AT VAL "12",N-PI/PI;"
*"
 200 IF C$(N)="█" AND B$(N)="" T
HEN GOTO VAL "600"
 210 GOTO VAL "90"
 500 LET X=X+.025
 520 GOTO VAL "70"
 600 PRINT AT VAL "10",N-PI/PI;C
HR$ 141;AT VAL "11",N-PI/PI;"$";
AT VAL "1",N-PI/PI;"█"
 630 PRINT AT CODE ":",CODE "£";
"CAUGHT"
 640 INPUT D$
 650 CLS
 660 RUN
```

Jumper
Luuk Hilhorst

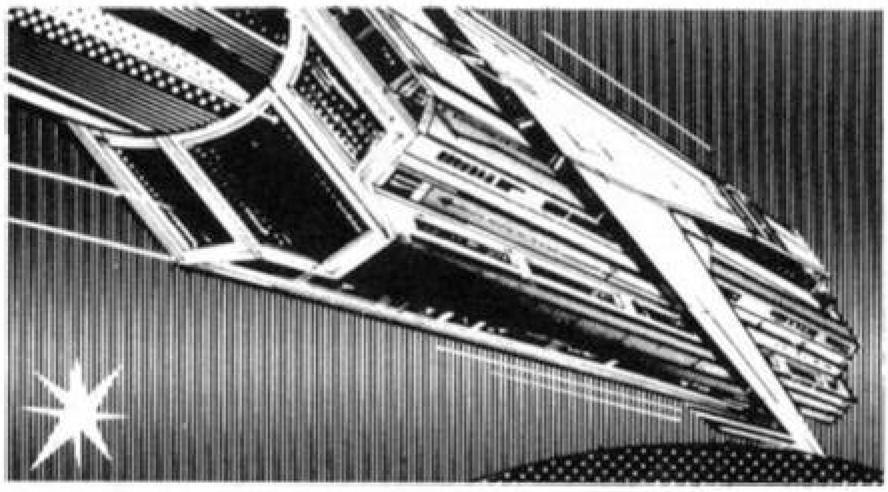
In this simple but irriatingly addictive game you have to jump over the balls (*) by pressing 0 to jump.

When you run the program you will see the ground, the jumper and the moving balls.

Lines	
10-20	set up string with the balls
40	change the position of the balls
60-70	check if the jump routine is required
80	print balls
90-95	what the jumper has hit
100-104	jump routine

```
   1 LET X=SGN PI
   2 LET S=NOT PI
   3 FOR I=NOT PI TO CODE "2"
   5 PRINT AT 2,I;CHR$ 137
   6 NEXT I
  10 LET A$="   *    *          *
*    *   *"
  20 LET A$=A$+A$
  30 LET A=NOT PI
  40 LET A=A+SGN PI
  45 PRINT AT X,10;" "
  50 IF A=31 THEN GOTO 30
  60 IF X=1 AND INKEY$="0" THEN
GOSUB 100
  70 IF X=0 THEN GOSUB 101
  80 PRINT AT 1,0;A$(A TO A+31)
  85 LET S=S+1
  90 PRINT AT X,10;
  95 IF PEEK (256*PEEK 19399+PEE
K 16398)=23 THEN GOTO 110
  96 PRINT "Y"
  97 GOTO 40
 100 LET Y=4
 101 LET Y=Y-1
 102 IF Y=0 THEN LET X=1
 103 IF Y>0 THEN LET X=0
 104 RETURN
 110 PRINT "DEAD"
 120 PRINT AT 0,0;"SCORE:";S
```





Asteroids
P Steer

As captain of the space freighter Spectrom you have to negotiate through the asteroids to reach the time warp. Your ship "H" is controlled by keys 0 and 8 to move left and right and you also have the luxury of ten laser shots which will penetrate five places ahead of you. Fire your laser with key 1.

A very sophisticated program for 1K!

```
   5 LET W=VAL "10"
  10 LET D=VAL "5"
  15 FOR E=VAL "0" TO VAL "149"
  20 SCROLL
  25 PRINT AT VAL "19",INT (RND*
VAL "8");"00"
  30 PRINT AT VAL "0",D;
  35 IF PEEK (PEEK VAL "16398"+V
AL "256"*PEEK VAL "16399")=CODE
"0" THEN GOTO VAL "1000"
  36 PRINT VAL "0";D;"H"
  40 LET D=D+(INKEY$="0")-(INKEY
$="8")
  45 IF INKEY$="1" THEN GOSUB VA
L "100"
  46 IF D>VAL "8" OR D<VAL "0" T
HEN LET D=VAL "8"
  50 NEXT E
  51 PRINT AT CODE "+",CODE "";"
TIME WARP"
  52 FOR S=VAL "0" TO VAL "30"
  53 SCROLL
  54 PRINT "..      +      .."
  55 NEXT S
  56 CLS
  60 PRINT "YOU MADE IT"
  65 GOTO VAL "1010"
 100 FOR S=VAL "1" TO VAL "5"
 105 IF W<VAL "1" THEN RETURN
 110 PRINT AT S,D;"-"
 115 PRINT AT S,D;" "
 120 NEXT S
 125 LET W=W-1
 126 IF W<1 THEN PRINT "NO ENERG
Y LEFT"
 130 RETURN
1000 PRINT "▒"
1010 PRINT "SCORE=";E
1020 PRINT "ENERGY LEFT=";W
```

Quicksoft

Clive Smith lurks among some more unusual programs

Rainy Day
Cases Computer Simulations

Ray the Ed. has just dropped off a load of cassettes for me to review. sorry wife, I shall have to stop the decorating and press on with these (he he!).

First of these is Rainy Day, nothing to do with rain but a compendium of games to play when it's raining. If you're rich you can use your Currah speech unit and the program is compatible with a number of joystick interfaces.

There are three games which you can play. Game 1 is called 'puzzle unit', where you can choose one of ten pictures which are jumbled up. Then, with the aid of the cursor, you have to put them back into their original form.

Game 2, called 'Codebreaker', is based on the Mastermind game. Instead of colours though, they use numbers which makes it more difficult. You have to break the code within 15 attempts and if you are successful a safe door will open.

Game 3 on the tape is not really a game at all but a reaction test. A ball is dropped from the top of the screen into a glass at the bottom of the screen and you have to hit a key before it reaches there. Comments are made on your ability.

Not a bad tape for £2.99 which I think has been aimed at the 10 to 16 age group. (To tell you the truth I couldn't do the pictures). Spectrum 48K only.



Double Dealer
M F M Software

As you might guess from the title, it's a card game. There are two games, one on either side.

Game 1 is 'Black Jack' or for the less informed, 'Pontoon'. A fairly simple game where you are dealt two cards and, with the cards you have or more if you require, hope they add up to 21. Go over 21 and you have 'bust and lost. If your cards are less than 21 you have the option of either 'sticking' with what have got and hope the computer cannot beat you, or 'twisting' and have another card to try and reach 21.



On the other side the game is a little more complex, but nothing as complicated as bridge. It's 'Stud Poker', one of the best gambling card games there is. I won't go into the rules now, but basically each player has a 'hand' which carries a value. You have to try and assess the value of your opponent's cards and if you think your cards are worth more than his, then you bet money which he has to equal to stay in the game. If he has a low value he can 'fold' and drop out. However he might have a low value and try and bluff you. The computer will play the most experienced player and has all the abilities of bluffing and clever betting.

A very good game and well written, but I thought the layout of the cards could have been better. For the 'Mavericks' amongst you it's played with a French deck with 2's as a wild option.

Double Dealer is for the 48K mavericks only £6.50.

Athlete
Buffer Micro Ltd.

To keep the Olympic spirit go out and buy this tape. There are five events which you can take part, 2 sprints, 2 hurdles (110 & 400 metres) and the hammer throw.

In the track events you compete against two other athletes. To win each race you have to press a key which increases your effort as you run. Too much effort and you will fall flat on your face with exhaustion, too little effort and you come in last. A scale at the bottom of the screen shows you how much effort you are using and also a scale of what distance is left to run.

In the hurdles you have another key to press to make your man jump.



There are facilities for training and a choice of event. Graphically it's not bad but there is an awful lot of time wasted with menu's between each event.

Overall 'Good fun' and your moneyis not wasted. 'Athlete' is for the 48K owners only. £5.95

Blockbuster
Compusound

Based on the TV series of the same name, Blockbuster is a quiz game. You get two cassettes in a presentation box and hundred of questions to answer. It's a game of speed and skill. The question is flashed across the screen and the first person to hit a key can answer it.

The screen shows a 'honeycombed' grid and for each correct answer one space is filled in with your colour. The idea is to get from one side of the screen to the other and block your opponents route.

You can either play the computer or a friend. There are also different skill levels to choose from.

A very well thought out game and clever use of questions, if you like quizzes I'd recommend it to you.

Blockbuster is written for the 48K Spectrum and will cost you £5.95.



XOR
Xorsoft Spectune

There are many 'make music' tapes about and this is one of the better ones.

Without the use of external hardware you are limited to what the spectrum can offer and this program makes use of everything the spectrum has. It turns the Spectrum into a piano keyboard with 34 notes. You can adjust the bar length and the crotchet length, (sounds painful). It gives you a good range of all the sharps and flats etc. and it can also memorise your tune and play it back to you. You can also edit and change your tune and it can hold up to 2500 notes.

Written for the 48K it will set you back £5.95.

Oh Well, back to the decorating.



The Prizes:

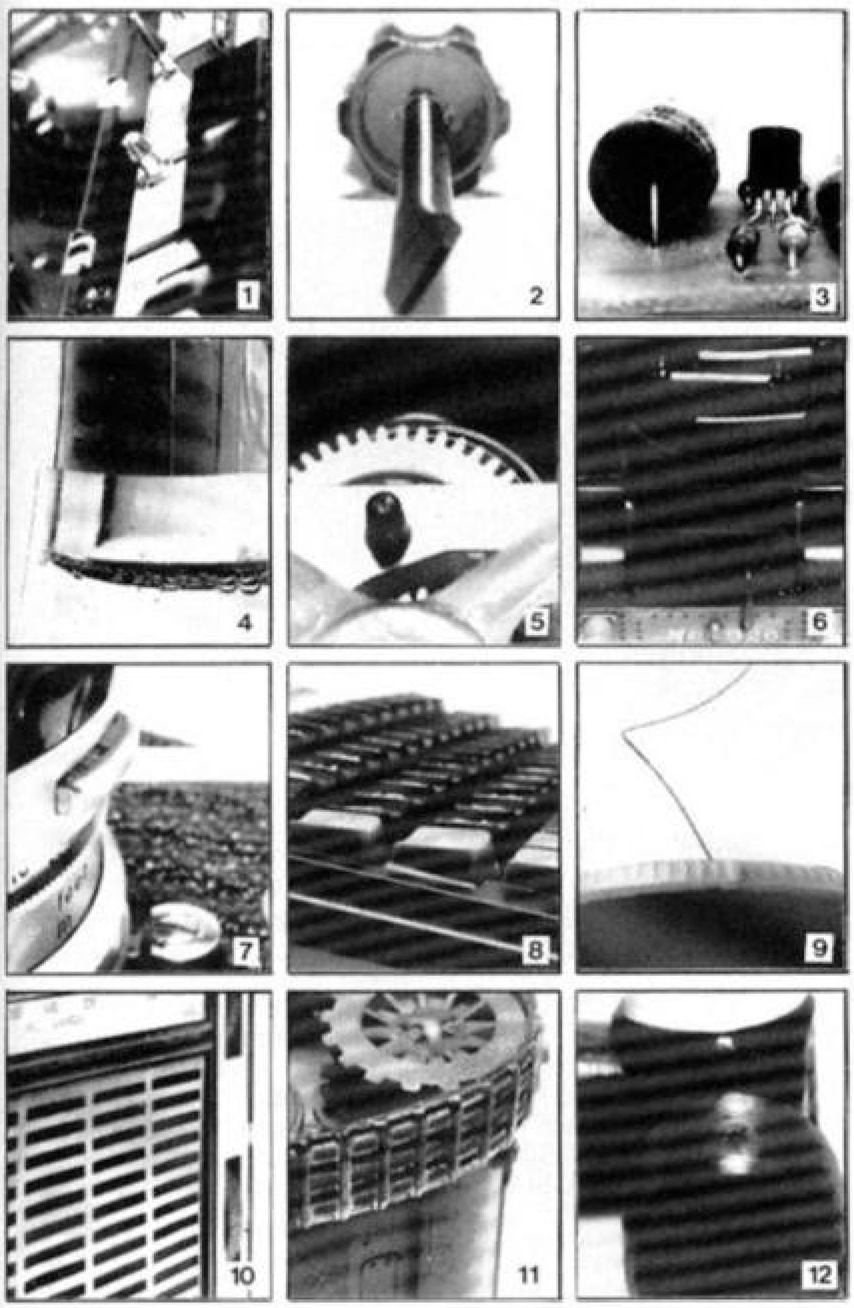
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Your Commodore

and write your (one-word) answers in the spaces provided on the coupon. For instance, if you think that number 9 is a record, write 'record' in the space next to 9 on the coupon and so on. Then tell us in up to 20 words why **MAGAZINES MAKE IDEAL HOLIDAY READING.** Complete the coupon in BLOCK LETTERS, and send it to: *DREAM HOLIDAY COMPETITION, Argus Specialist Publications Ltd., No 1 Golden Square, London W1R 3AB*, to reach us no later than 31st December 1984.

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3 All entries must be postmarked before 31st December 1984.

4 The prizes will be awarded to the first four entrants who identify the twelve objects correctly and whose completed sentence is judged the most apt and original.

5 No correspondence will be entered into about the competition results: the judges' decision is final.

6 Winners will be notified by post and the results will be published in a future issue of this magazine.

The 12 objects are

1. .... 2. .... 3. ....

4. .... 5. .... 6. ....

7. .... 8. .... 9. ....

10. .... 11. .... 12. ....

Magazines make ideal holiday reading because *(up to 20 words)* ....

....

NAME *(BLOCK LETTERS)* ________________ AGE *(if under 18)* ________

ADDRESS ________________ **ZXC**

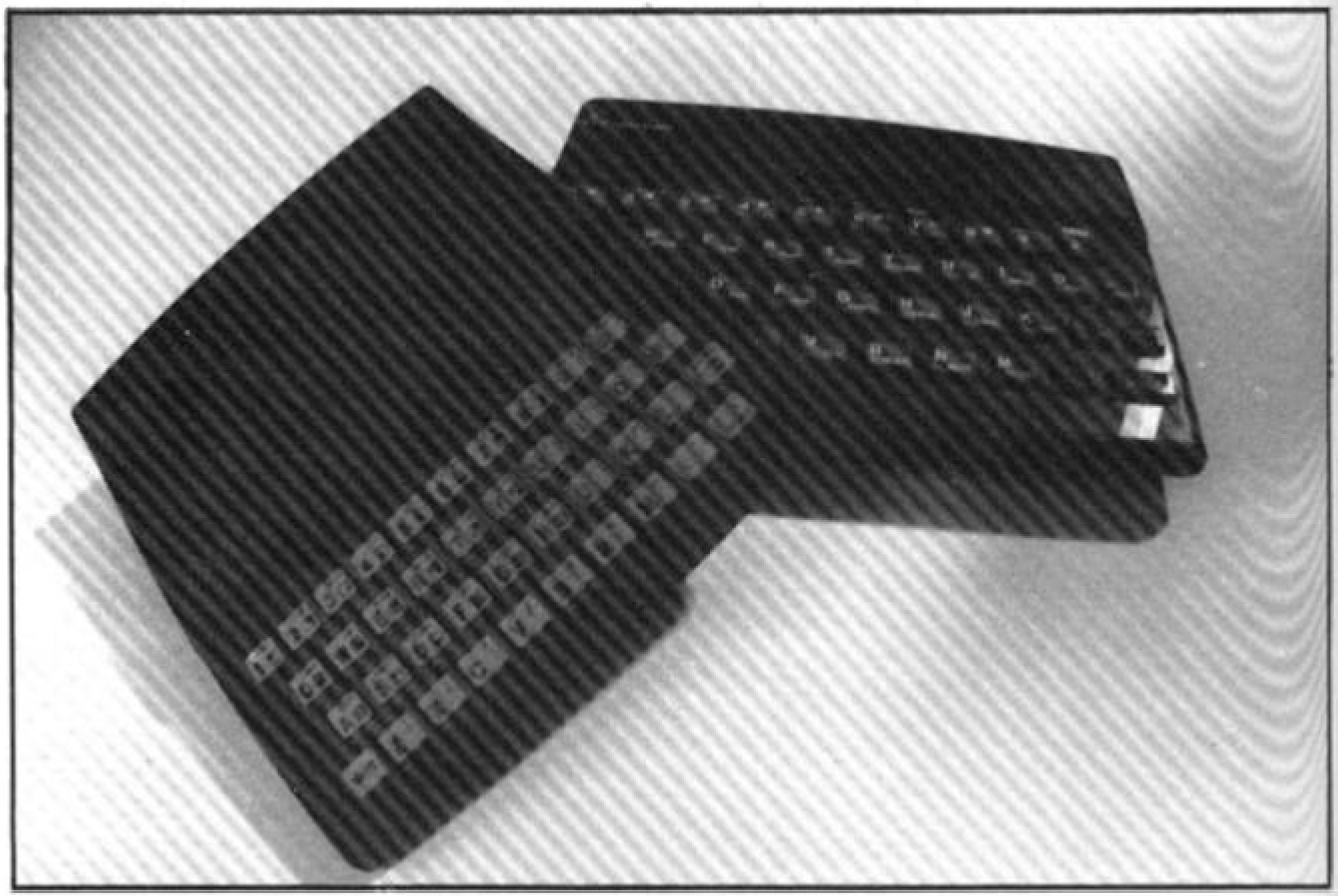
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De-bugger

Getting a program typed in is often only the start of your problems. Ed to the rescue.

Typing in a program is a useful exercise. Apart from the patience required, techniques learned and the end program to be used, probably the most educational part of it is tracking down the bugs introduced by yourself or occasionally by our publication system.

In debugging you gain a much deeper insight and understanding on how the program actually works than by merely typing it in, but tracking down these errors is an art in itself and needs some skill. So here are some tips to help you in your efforts when faced with that cryptic error report!



1 NEXT without FOR
Look back through the program, either the loop has not been set up — no related FOR 'letter' = No1 TO No2 line, or the letter has been re-used as an ordinary variable within the loop with a LET 'letter' = No.

2 Variable not found
This is one of the most common errors. Again, the problem may not lie in the line where the error was detected and reported. If there is only one variable, which may be one or more letters or a string ($) variable, then that is the problem. There may be more than one variable in the line section reported and you will have to identify the offending one. In a line PRINT AT Y,X;A$ the culprit could be Y or X or A$. To find out which of them is causing the problem (it may be more than one) type in turn as a direct command:

PRINT Y Enter/Newline
PRINT X Enter/Newline
PRINT A$ Enter/Newline

Note which produces the error report. Now look back through the program printout for the line which sets it up — usually a LET or FOR command. Did you leave it out? Does the program get there or has a GOTO/GOSUB been wrongly addressed?

3 Subscript wrong
Connected with DIM A(No) or DIM A$(No). If the number in the brackets on the line where the error is reported is greater than the one in the original DIM statement, is not an integer or is less than 1, then this report is generated. If the subscript — number in brackets — is a number then check and change, however, if it is a variable then follow the procedure for tracing variables. It has probably exceeded the limits, look for lines with the variable being altered with + – * / : if necessary add limiting code. For example:

IF X >10 THEN LET X = 10

4 Out of memory
As well as for programs which are too big, it may happen if the previous program set RAMtop. Before despairing, enter CLEAR USR "a"-1 on the Spectrum: on the ZX81 SAVE the program, turn the machine off and on, then reload the program.

7 RETURN without GOSUB
Somehow the computer has reached a RETURN command other than via a GOSUB instruction. Check a GOTO hasn't been entered in place of a GOSUB. Check for a missing GOSUB.

B Integer out of range
An integer (whole number) either as a number of variable is too big or small and you are attempting to do something like PRINT AT 0,33 — not allowed! Check any variables involved as per report 2 and trace it back through the program looking for adjustments to it by + – * / : Add limiting code if needed — see report 3

E Out of DATA
A Spectrum problem. Check the number of DATA items match the number of READs; usually one (or more) has been missed out. Attempting to reread a DATA list without first using a RESTORE command will cause this and it can happen on an auto start program (saved with a LINE number). Good programming usually RESTOREs to the correct line number before using READ.

I FOR without NEXT
See report 1 but this time the NEXT is missing!

Note that the letters I have used for examples could by ANY letters not just A$,X,Y etc and depend on the particular choice of the programmer.

This is by no means a comprehensive list but I have tried to cover many of the most common error reports. Personally, I get almost as much satisfaction from debugging as I do from programming I do assure you, however, that there is absolutely no truth in the rumour that we deliberately inject bugs into our listings in order to introduce you to the dubious delights of debugging!

Mind Play

Greg Turnbull looks at games of strategy and skill.

Apocalypse Expansion Kit Vol.1 Nova Maps. Red Shift £4.95

For a review of the base program, see page 49 of the Apr/May issue. this tape is for wargamers who have grown accustomed to the maps of the main program. The new scenarios use the same rules, but give you a chance to try out different tactics. They include:

- **U.S.A.**

Mostly land-based warfare; high city densities for troop conflict. Nukes would be very destructive. For revenue play, the winning target is 240 points.

- **S. AFRICA**

Another land battle; could support many player power zones. Rapid and devastating troop attacks are possible.

- **SE. ASIA**

A marvellous map; similar to that of 'Europe'. Large sea areas for aquatic conflict. The troop distances are large, making Nukes ineffective. Many coastal bases are available. this is definitely my favourite my favourite of the new maps.

- **ARTIC**

Interesting picture of the North pole. Only 201 revenue points needed to win in points-play.

- **GALACTIC**

The last two maps take the play out of the usual terrestrial-based warfare. This adds new interest to the game. Wide-spread centres allows for space ship dominance of this map.

- **NETHER EARTH**

Unusual city names here; many appear to be based on a well-known Tolkien book!

Overall this tape is a useful addition to the Apocalypse range. It prevents you from getting bored with the earlier situations.

Apocalypse historical scenarios. Vol.2 Chapters 1 & 2. £4.95 each.

These are four new expansion programs, with data files, They MERGE with the main game. Unfortunately this takes a long time; and to play a different game you have to reload the whole lot! The advantage is that you essentially have five different games totalling some 400K. The rules are slightly altered, as are start conditions, which helps to keep you interested in playing out the situations again and again. This feature significantly extends the useful life of the program. Red Shift say it is selling as well now, as when it was first produced last year.

In all four programs the centres are already distributed, and troops deployed for you. The players merely decided which empire or force they wish to assume then straight on with the play. Specifically the programs are:

- **DECLINE AND FALL (OF ROME)**

Disease is the main change here. Although random its local effects are very significant on your troops.

The combat phase is slightly changed. However it is stil based on an input number of divisions used. This can be set by the player, and is perhaps not the most satisfactory method of deciding who wins a battle.

- **NAPOLEON'S CAMPAIGNS**

Generals are introduced here, their symbols can be viewed on the main map. A time limit for play is introduced. As in real life the generals when defeated, may be either captured or escape. No Nukes are allowed in these early period wargames.

- **WAR IN THE PACIFIC**

An airstrike option replaces the Nukes phase of the main program. Otherwise the rules are essentially the same.

- **1984**

This is the most interesting of the new situations; and the most graphically effective. A world tension bar reflects changes in Europe. Wars and the use of Nukes increases the indicator; disarmament decreases it. If the bar turns red total global thermonuclear war ensues! This appears to be almost unavoidable in extended games; hopefully not representative of real life. The graphics of the world destruction are well done, and fun to watch.

Overall some very useful additions to the Apocalypse range, and moderately priced too. Sadly no further expansions are planned as yet. However, future tapes should have M.code maps for increased speed during loading.

The quest for the Holy Grail. 48K Spectrum, Dream Software

This is a new graphic adventure game from an up-and-coming company; Dream Software. The current trend for flashy presentation packaging is continued. The instruction pamphlet (like the program itself) contains witty notes and very few clues.

As usual the tape takes forever to load; although the screen display is claimed as 'Cert. XX'. Once loaded you are straight into the adventure, with very little to help you.

The screen display is horizontally split Hobbit-style, with scrolling pictures and text. From the name you might expect this to be purely a medieval adventure, like 'Knight's Quest'. You would be wrong; it's right up to date including: CND pickets, nuclear powered lamps, motorways etc.

When a picture of a modern road with street-lights appears, the text says: "This picture is 500 years before its time, but who cares!" There are also various references to other programs, for example: Eugene from Inagime, and if you ask 'who' you get "This isn't 'Valhalla' you know."

The usual adventure facilities save/load/quit are provided. Plus graphics on/off, for when you get sick of seeing them time after time. However no help or score routines are available, nor is character interaction allowed.

Don't be tempted to use bad language if you get frustrated; the program doesn't like it. It can even get insulting and will call you a nerd, or a berk on some incorrect entries. The response are quick, as is the screen drawing. Unfortunately the pictures don't help the action much, and are really just padding.

It is incredibly easy to get killed; this is where the program lets itself down. You can be battered to death with a VIC20, or suffer one of numerous other equally nasty fates. For example: If you try to enter the cesspit, it says: "You're not God, and haven't learnt to walk on water yet." The program abounds with such humorous touches; one aspect which is good fun.

Eventually you may manage to reach Camelot castle; just as you were thinking you had loaded the wrong tape by mistake. Once inside I was immediately killed by the French guard. He unclogs his nose in your direction, and you die a horrible green death!

The film buffs among you will recognise this as a reference from the hilarious "Monty Python and the Holy Grail." This appears to have been the inspiration for the program; those who have seen the film wil therefore be at an advantage. For instance: You can die at the hands of the knights who say 'NIC'; and get frizzled into a pile of bile salts! (Your fate can be quite gruesome at times.)

Ultimately you get frustrated with going through the early stages so often. The terminal boredom sets in; as dying is so easy, and happens very quickly. You merely get transported back to the start to try again. So for all its comic touches this program is already out of date by today's high standard of games.

The copying of a Hobbit-style screen and the addition of Monty Python ideas doesn't manage to hold your interest. The text and scenarios soon become tiresome, causing you to lose any incentive to try and progress further. Sorry Dream, better luck with the next attempt.

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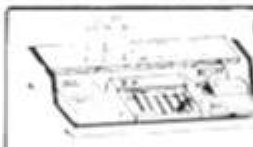
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AD INDEX